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EDITORIAL.

THE MUCH-ABUSED TITLE OF DOCTOR OF MEDICINE.

In the good old days, as the conventional phrase runs, when simplicity marked our medical sociology, the title of doctor preceding a name, be it never so commonplace, meant a distinction that could not be easily misconstrued. True, even in those times of uncomplicated machinery, a number of disreputables assumed honors which did not rightly belong to them, but, though in certain communities our lax laws allowed this dereliction to wax strong, the acumen of the fairly intelligent stood them in good stead in the matter of differentiating between the real and the bogus article. In short, a quack bore the stigma of his class and, being under the burden of an ostracism that meant considerable cold-shouldering on the part of those whose money would have been thrice welcome, he resorted to the only medium which was open to him through which to announce his virtues to a stubborn public—the daily press. By doing this he declared his complete segregation from those who held diplomas that were worthy of the name; he made money, it is true, but his glory did not last; for being an ordinary human being, in most cases, with a too evident desire to reap the richest harvest, he played to a contingent in a community that wants something in return for its money, though in the beginning it may be dazzled by bombast. And so before long, the fat, gilt lettering, which had beautified the time-worn brick front of the building which housed the quack—old buildings were always preferred, perhaps, because quackery is so much older than real medical science—vanished, as if by magic; the cobwebs returned to their former haunts; and "Ichabod, thy glory is departed" was the message to be garnered by the wary. Strange, as it may seem, the meretricious irrup-

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tions of this special form of quackery into communities was lightly thought of; perhaps, too lightly, but then it must be stated in extenuation of what was a too benign attitude that we were too light-hearted and too childish a people at that time to recognize the value of the inherent beauties and advantages and stringencies of the laws which are with us at present.

With the passing of the sort of quack, whom we have attempted to describe, the qualified practitioner grew more hopeful; and, though he should have known that one evil begets another, he gave but small thought to what was in store for him. This mental attitude was not due to any romantic notions as to what this very real world spelt for him, but rather to the fact that with the obstreperous and ubiquitous quack out of the way, there was no need to fear that any serious molestation could arrive from other sources. In short, he believed that the title, which he bore with considerable pride, would not again be tarnished by anyone whose practices might be construed, by the unthinking part of the laity, as similar to his own. Complaisance such as this was bound to be disturbed, especially in the medical profession, the door of which for some unexplainable reason is always too greatly ajar; and before many days elapsed the blazed trail, which had been deserted since the quack had been uprooted, was again invaded by those whose ways were gentle when compared with the sensational outpourings of their predecessors, but whose obscure workings and general lack of medical education nevertheless made them an undeniable menace to the fair name of doctor.

Now, since this is the case, what recourse has the reputable physician when he hears that the irregulars and opticians, having taken their courses of studies, are just as much entitled to the much-coveted prefix as he is, though they may have pored over their peculiar studies only for a month or a year—and a very short one at that—while for him to arrive at his goal meant achievement by the sweat of his brow? True, he will be told by his fellowmen in the ranks of medicine that his superiority to the "others" is so apparent that he need fear no harm from invidious comparisons, even when these are made by people who ought to know better; that the laws are ever and ever increasing in stringency; and that before long—what a convenient phrase "before long" is!—the wrongs, which now grate on his nerves, will be righted. But these words, which fairly drip with the optimism that one would apply to a recalcitrant child that grows restive under imaginary wrongs, are really wide of the mark, not only because their reiteration has robbed them of their pristine strength, but because the initiated know that they are offered in the spirit of a makeshift. They are sure of this because on

all sides there are evidences that the improvements so much talked about are not apparent, even to the most observant, and that the supineness which permeates the rank and file of humanity continues to make light of a differentiation between the holder of a diploma from a medical college of standing and the offspring of a frayed alma mater, so long as the cabalistic prefix declares the latter to be one of the elect.

After studying the conditions, as they exist in all our large cities, are we wrong in saying that it would be advisable for the qualified practitioners to take the matter in their own hands, if they hope for a fruition of the desire to elevate the title of doctor of medicine to the heights upon which it rested until it was dragged through the mire by the unscrupulous? Would it be futile to evolve a plan such as this: All qualified practitioners be compelled to write "doctor of medicine," *i. e.*, Dr. med. in front of their names?—a compulsion that should show no laxity, since its object is not only to instruct the people at large, but prevent the osteopath, the optician and others too numerous to mention, from arrogating to themselves an honor that, on account of its bastardy, is to-day an exceedingly commonplace designation. Now this may sound Utopian, but it is done in other countries—namely, in the German speaking ones, where systematization is a cult that it would be well for us to follow. Of course, there is no denying that this would be a slavish imitation of something that is foreign—hence, despicable; but despite this apparently insuperable drawback, and not overlooking the awkwardness of the more elaborate designation, would not the results counteract these and other objections? We think they would, for the reason that almost immediately the line of demarcation would plainly show who is the doctor of medicine and who is the doctor masquerading in soiled and tattered garments that must be cautiously arranged to hide his ignorances.

THE YOKE OF CLEANLINESS.

That decidedly contentious subject, as to what really constitutes personal cleanliness, has at last received the sort of attention that cannot but result in the partial solution of this tantalizing problem. According to our limited readings in various literatures, personal cleanliness is so much a matter of nationality that to argue on the subject is a sheer waste of time; but, though Dr. A. R. Reder, Health Officer of Aurora, Illinois, may be of a like opinion, his undauntedness in the matter proclaims that he is not going to allow the question of nationality to override his earnest

desire to teach the principles of cleanliness, even though force and intimidation have to be called into play. For the mandate has gone forth from his special office in the Temple of Hygiene that the Hungarians, Roumanians, Lithuanians, Slavs, and Mexicans, who make up a goodly part of the population of Aurora, must bathe at least once a week or take the undesirable alternative of going to jail. This drastic conception, of what our future Americans must do to fit in with our advanced ideas, may strike the superficial thinker as altogether too autocratic; but the results are already heartening, and what with other explicit rules laid down by Dr. Reder, which are just as rigorously enforced, no fair-minded critic should withhold his admiration.

When we read, in our leisure moments, those discouraging books, "The American Scene," by Henry James and "The Future in America," by H. G. Wells, we felt that all ideas of Americanizing the unkempt foreigner were wrong; for these students of our sociology saw only the reverse side of the amalgamating process which our exuberance is fostering so that out of crudity, culture and refinement, as we understand it, shall be evolved. The writers we have mentioned, we take it, being followers of the teachings of the late Sir Francis Galton, notably of his "Inquiries into Human Faculty," attached too much importance to inborn capacity and too little to environmental influence; hence, their chapters had an air of gloom. Their literary purblindness limited them to observing the national traits of the unregenerate foreigner to the exclusion of the beneficial fruits of environment. Now, though it is not our intention to combat the theories of those who are staunch in their opinions of heredity, or champion those who know that environment must bear very good lessons for the individual, no matter how obtuse he may be in the beginning, the results which Dr. Reder has achieved must clearly show to all of us that environment is not an altogether negligible factor. In other words, though our American ways of cooking, of talking, of doing business may never be acquired by the foreigner so that amalgamation shall be complete, there are some advantages accruing him by his sojourn among us—namely, the enlightened lesson of the once-a-week bath!

The subject of bathing has been "on the carpet" as often, we imagine, as has the subject of ventilation and draughts. Neither is any nearer solution than it was some decades back; and though the writer of these lines fully recognizes the good points of bathing and the bad points of draughts, all medical writers are not at one on these subjects. For instance, when only a few years ago Metchnikoff of Paris, and Nascher of New York, were telling us why we were senile at the early age of

seventy, did not a German investigator—a medical man, be it understood—make the rounds of his own country and publish statistics which showed that the centenarians he had come across were well preserved, despite the fact that not one had taken a bath in twenty years, and some not in thirty? Now, if we are at all interested in how to prolong life, ought not this to give us pause? But, no doubt, Dr. Reder is of that practicality which sees only the immediate good results of the bath, and is not aware that we need these Hungarians, these Roumanians, these Lithuanians for many years to come to do certain "rough work" that requires a muscular strength which should not be vitiated even by the bath at seven days' interval. On the other hand, would not Mr. James and Mr. Wells, men who are interested in eventualities, see in the shortening of the lives of the immigrants by bathing, the reasons why a limited number of "American" years in their lives must be held accountable for lack of the complete Americanization which they had hoped to see?

THE AGE FOR RETIRING FROM PRACTICE.

A matter, which has been agitating the younger members of the medical profession for many a day, is the very vital one which may be evolved into the query, Why does it so often happen that medical men, who have long since reached their apogee, continue to practise the art of medicine when retirement would mean a lessening of the competition, which is at present so menacing to the peace of youth ever on the alert to supplant and acquire? The answer to this complicated question is not easy, since it has never been decided by any philosopher of this dire situation just when a man, who is actively engaged in work, should announce to the world his inability to continue in his chosen profession, and declare that the laurels, which he had patiently gathered throughout a large number of years, have no longer any fascination for him. Barrie, the Scottish novelist, some time back wrote a little book, entitled "Better Dead," in which he set forth his ideas to good purpose; for, with considerable ingenuity, he described the successes of a Society for the Doing Away of Certain Great Men—Gladstone and Bismarck had been singled out—so that their fame should not be weakened by living too long and dying, as Dean Swift did, "at the top." But so drastic a measure as advocated by Barrie would hardly be countenanced, even by those young men in the medical profession, who are amongst the most enthusiastic to devise some means whereby their monetary condi-

tion might be improved; therefore, a consideration of this plan is out of the question. It would seem, then, that some other method must be pursued if similar results shall be achieved: something that is more humane and that shall not cast odium on the perpetrators. In the meantime, a suggestion has come from abroad that is well worth conserving, for a French court has recently decided that, at the age of sixty-eight, a medical practitioner should be desirous of taking a well-earned rest and be less burdened with the fatigues of practice. We are now speaking of the damage suit brought by Dr. Cheurlot against the owner of a motor-car which had collided with his carriage, and for which occurrence the physician asked 220,000 francs, of which 10,000 were for medical attendance and medicine, 60,000 francs for inability to see his patients, and 150,000 francs for the decrease of his practice on account of limited activity that prevented his seeing as many patients as was his wont. Although the court awarded Dr. Cheurlot only 60,000 francs, we take it the smallness of the sum did not cut so deep into his sensibility as the opinion that at his age, retirement should be his uppermost thought.

What we have just stated should not dishearten our youthful confrères too greatly, for, while it must be admitted that in our very young country the age of sixty-eight is invariably thought of as senility and retirement on the part of the physician to be effective should usually take place some years prior to this, the mere fact that a court has decided that a physician is old at sixty-eight must strike joy into the hearts of all advocates of compulsory obliteration. At least they have a premise upon which to work, and if they will but pursue their thought sedulously and without too much blare of trumpets, they might reduce the age for giving up medical activities from sixty-eight to sixty-five. A few years in other matters do not count for much, but when it is a question of such close competition as obtains to-day in the practice of medicine, the short space of three years may mean that the apportioning of a large clientele, recently relinquished, will yield to some of those, who are in their fortieth year and who have patiently waited for the windfall, at least two if not three patients that would not have been theirs had not the "prominent doctor" seen fit "to step down."

OPINION AND CRITICISM.

THE TRUTH ABOUT MEDICAL ETHICS.

The unsavory pictures of the present state of medical ethics, painted in the daily newspapers of some of our large cities, deserve special attention because most of the light thrown on these pictures has been furnished by well-known members of the profession, and ethics in medicine is no more or less than ethics in any other respectable calling, and in principle is a mere rule of conduct which should govern men of honor. The basic error in a cut-and-dried code of ethics, however, lies in the assumption that all men are honest, and since such a general statement can never hold true, there is no valid reason for presuming that that portion of the human race which enters the study and practice of medicine consists entirely of honest men. Even though medicine may be the most honorable profession, even though traits of character are necessary in a physician, which are not required in any other line of work, doctors are still human and subject to all those temptations which a mere human being finds so hard to resist. Principles of absolute right and wrong have not proved satisfactory in the solution of the world's morals: what is wrong with one generation becomes right with the next, and the customs of one age or of one people constitute the court of last appeal on ethical questions relating to that people. In other words, morals result from conventions made by environmental development and tending toward what for the time being, is the greatest good for the greatest number. Polygamy, to-day, is unethical, not because of any inherent immoral principle, but because civilization has reached a stage in its evolution when monogamy is productive of the greatest good.

Reverting now to medical ethics, it seems well worth the trouble of looking matters square in the face, and of separating the truth from the nonsense. A system based on theoretical ideals of great beauty will be successful only when it is supported by men with corresponding ideals. And it were an idle dream to believe that the thousands of men who enter medicine are able to separate the magnificent opportunities for self-sacrificing endeavor from the business of living. Physicians who spend years in training have the normal right to demand a fair return in wage from their profession. The step from this fair return to the business of making money is short and quick—and then the physician becomes the business man. This brings up a new point of view; if my neighbor who runs a shoe shop can use any honorable means to get customers,

if he can advertise that his shoes last longer than Blank's, why cannot I do the same? Why must I, who know my subjects better than Dr. Jones, wait in my office till some automobile accident sends me a fracture to set? Why cannot I use the same good business methods that my father employed—and my father is an honorable citizen of his community? Old Dr. Gray, who has just returned from Europe, has a column in every paper, young Dr. Green certainly uses methods that are not strictly ethical, yet both are members in good standing in the medical societies, both "enjoy" many comforts of life which I must deny myself, because I adhere strictly to the letter of the code. When I see medical politics running societies, when I see schools where graft and money are the prime reasons for appointments, I cannot help asking "what's the use?"

This point of view is logical and cannot be snickered at or passed over in silence. The invasion of the ideals of practice by the desire of doing a good business is, however, the root of the evil of bad medical ethics, for as soon as commercialism controls medicine, so soon does the structure fall to pieces. To-day, although we have a code of ethics, we have in the profession a much stronger and older passion—the struggle for existence: a passion against which stronger forces than regulated morals have beat their wings in vain. The struggle of the beginner to be decent is unfortunately as a rule, not helped by communion with the men "already there," too many of whom measure their success by the additional zeros on their bank account. It is a safe commentary on the working of the human mind to say that it is far easier for the man on top to preach ethics than it was for him to practise the same principles when, perhaps, his next meal depended on the arrival of a patient.

The present standard of ethics is theoretically the remedy for the disease, but practically because of the natural limitations of humanity it falls short of its purpose. As a deeper therapeutic endeavor, we suggest the thought that the decrease in the number of physicians, which is bound to result from the bettering of educational requirements, will eventually be one of the most efficacious agents in the fight for cleaner medical morals. As long as the supply of physicians exceeds the demand, so long will monetary considerations remain the basis of practice, and the tentacles of greed in reaching for the needed money of the patient will not hesitate to grasp and destroy the reputation of a neighbor. Further, it is necessary to realize that common-sense interpretation of ethical conduct is more conductive to honesty than blind obedience to any code. He who wants to be honorable will be so, and he who wants to cheat will cheat, whether or not a code exists. All men should be compelled to adhere to common laws of decency and honorable dealing, and infringements of these laws, whether executed by the old and the tried, or by the young, should be considered sufficient ground for an open ostracism.

THE MEIOSTAGMIN REACTION.

In another column of this issue will be found a review of the literature pertaining to the new Meiostagmin reaction. If the enthusiasm of the original investigators has not carried them to the airy flights of imagination, this new work bids fair to be one of the most interesting and most valuable immunity reactions in present-day diagnosis. Like many other biological tests this too has called to its aid the resources of chemistry, and now we have finally a true physico-chemical immunity reaction. The underlying principle is not essentially different from that producing the Wassermann, or other well-known diagnostic tests, being based on the production of specific antibodies by a specific cause; but its application is far more extensive and goes into fields so far untouched by pure biological research. A known agent will cause in the blood-serum of the host the production of certain bodies which, when combined with an extract of the etiological agent, have the effect of changing the surface tension of the serum. Such changes are measured by a properly constructed instrument; and if the original reports are to be believed, there is no difficulty in perceiving the difference hetween a positive and a negative reaction. The studies, so far undertaken, have shown not only that the test may be applied to the diagnosis of obscure infectious diseases, but that it may also be employed in malignant disease. Further confirmation of the remarkable reports of the Italian workers will be necessary, before too much reliance is placed on the Meiostagmin reaction, since up to the present all attempts, either to procure a definite biological test for the diagnosis of cancer, or to prove the existence of immune bodies in malignant disease, have not met with uniform success. However, the scepticism, which usually follows announcements that cannot but be classed with the unusual, should not prevent investigators from going into subjects with great care, so as to determine their exact value.

LITERARY NOTE.

In the *Revue des Deux Mondes*, of December 15th, Dr. Dupré has an essay on the insanity of Charles VI. of France, which has all the good points with which the writings of Cabanès, Nass, Witkowski and other French medico-historical authors have made us familiar. By good points we mean the minute analysis, according to the teachings of modern medical science, of diseases rightly or wrongly imputed to figures in history, and exceptional powers of insight by which obscurities, long since accepted as facts, are brought into the light of day. That there were traces of mental weakness among Charles VI.'s ancestors is a matter

of no small moment to the essayist. Jeanne of Bourbon, mother of the king, was at one time, mentally unbalanced; his grandfather died of apoplexy; and his uncle was a melancholic. Moreover, consanguineous marriages were of frequent occurrence among the descendants of St. Louis. Even during his adolescence, the king's life was characterized by debauchery, a habit of living that was never forsaken; and what with his fatigues, his depressions, the picture presented by Dr. Dupré does not indicate that physical development was rigorously pursued, though historians would have us believe the opposite on account of the famous endurance ride in the forest of Le Mans. The mendicant, who on that occasion, according to Froissart and Juvénal des Ursins, "more mad than sane, bareheaded, with naked feet clothed in a jerkin of white russet, rushed out from between the trees and boldly siezed the reins of the king's horse, exclaiming, 'King, ride no farther, but return, for thou art betrayed,'" is a pure figment and was the first hallucination with which the king was affected. The intermittent attacks of maniacal excitation during which the king recognized neither his wife nor children; the destruction of clothes and furniture and hangings; the periods of prostration following the delirious state; are dwelt upon by the writer to prove his contention that the derangement was a constitutional disequilibration of the emotions and the volition; an intermittent psychosis with predominance of maniacal attacks; confusional crises of short duration in combination with the maniacal excitation. "When he (the king) ate," says Juvénal des Ursins, "he was a wolf, a glutton. As for making him undress or change his clothes, that was out of the question; hence, he was covered with lice and vermin and filth."

ORIGINAL ARTICLES.

ALTERATIONS OF THE CIRCULATION ON GOITRE.*

By C. C. Guthrie, M. D., and A. H. Ryan, M. D., of Pittsburgh.

Introduction.—The purpose of this communication is to record additional observations on the results following alterations of the circulation in goitrous thyroid glands,[1] and to further discuss these results in the light of other observations and considerations with a view of determining the factors concerned in their production.

Results.—Marked anatomical changes occur in enlarged or goitrous thyroid glands of dogs after alteration of the circulation. The greatest changes observed, occur when the circulation is reversed in the inferior thyroid vein by anastomosing this vein with the central end of the common carotid artery or by making the anastomosis of the artery with the peripheral end of the internal jugular vein below the point of origin of the inferior thyroid vein. The gross changes consist of a temporary swelling (Fig. 1) followed by a marked decrease in size of the lobe on the operated side. (Fig. 2.) The lobe feels much harder and denser. Microscopically, if the goitre be of the hyperplastic type, generally more normal staining colloid is seen after the operation; while if the goitre be of the colloid type, a decrease in the colloid substance is observed. (See Fig. 3.) In both cases the operated lobes in size, physical properties, and histological structure tend to revert to the normal.

The general behavior and metabolism of an animal subjected to such an operation also undergo striking changes. In dog No. 16, observations as to condition and studies in metabolism were made both before and after such circulatory alterations in the enlarged thyroid gland. A control dog was observed and studied over the same period, having been subjected to an operation on the same day that dog No. 16 was operated upon. The operation in the control dog consisted in interposing a preserved segment of vessel between the cut end of the common carotid artery, this requiring about the same length of time as the thyroid operation. The results are shown in the following protocol and table.

*From the Physiological and Pharmacological Laboratories of the University of Pittsburgh.

PROTOCOL I.

Dog No. 16.—Light yellow adult bitch. Presents large bilaterally symmetrical goitre. Animal very nervous and easily excited, thin in flesh and coat is harsh. Eyes very prominent, pulse rapid. Kept in roof kennel with daily access to open roof space for exercise from February 25th to April 24th, 1908. Little or no change in animal's condition during this period, or if anything the general symptoms are more pronounced.

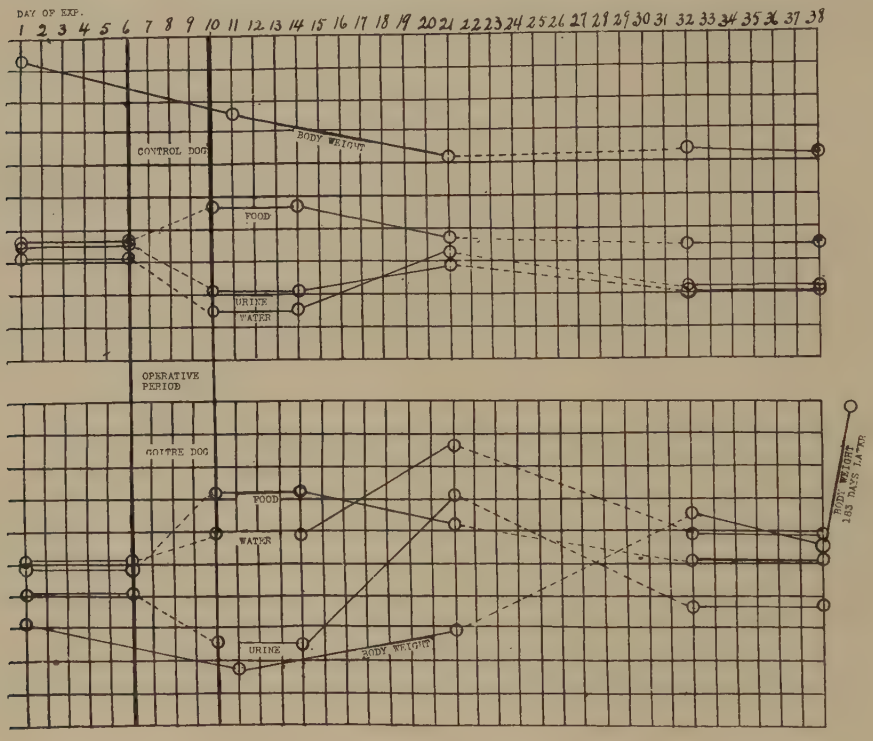
DAY OF EXP.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
CONTROL DOG
BODY WEIGHT
FOOD
URINE
WATER
OPERATIVE PERIOD
GOITRE DOG
FOOD
WATER
URINE
BODY WEIGHT
BODY WEIGHT 185 DAYS LATER

CHART I.

Curves as plotted from averages as shown in metabolism table.
Body weight: Two and one-half spaces equal one kilo.
Food: Three spaces equal 100 grams.
Water and urine: Two spaces equal 100 c.cm.
Since the chart is constructed from the table, the exact figures are readily obtainable.

April 24th, 1908, placed animal in metabolism cage. Weight at this time 6.3 K. (For metabolism results see Table and Chart I.) April 30th, 1908, photographed animal. Etherized, shaved neck and prepared for operation. Opened neck by incision in median line from lower level of cricoid cartilage to near manubrium of sternum and separated tissues down to anterior surface of trachea. Both thyroid lobes about same size, enlarged

and soft. Exposed and placed temporary clamp on right internal jugular vein below mouth of inferior thyroid vein. Ligated below this point and divided between the ligature and clamp and prepared the peripheral end for anastomosis. Exposed left common carotid artery and placed temporary clamp below and ligated above, central to the superior thyroid artery. Then divided between the ligature and clamp and prepared the central end for anastomosis, and united it to the peripheral end of the previously prepared jugular vein by end-to-end anastomosis. Removed clamps from the newly constructed vessel, thereby reversing the circulation in the peripheral portion of the right internal jugular vein and its branches. Ligated the main trunk of the vein just above the superior thyroid vein. Also ligated the left superior thyroid artery, thus decreasing the arterial blood supply of that lobe. The circulation in the

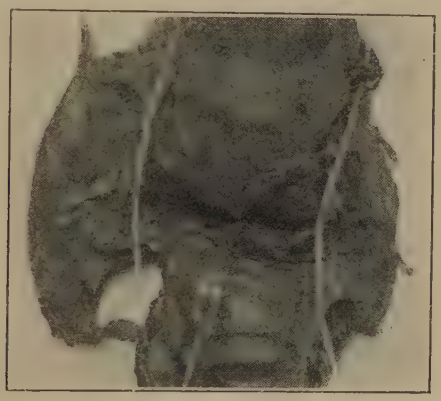

Fig. 1.

Showing enlargement after reversal of the circulation in the inferior thyroid vein to a normal thyroid lobe of a dog six days after operation. The operation was performed on the right side. (Cf. *Journal of the American Medical Association*, 1908, LI., 1658.)

right lobe of the thyroid at this time presents the appearance of enormous activity, the lobe rapidly swelling, the vessels seen on its surface standing out prominently and the whole mass being of an arterial hue and pulsating strongly. Evidences of edema rapidly appeared so that within a few minutes the lobe presented a greatly swollen and edematous appearance. Closed wound in neck. Swelling of right thyroid lobe still increasing. Applied large, soft dressing and placed animal in hospital. The animal speedily recovered from the anesthetic and appeared not to be in pain and but slightly inconvenienced by the operation.

May 1st, 1908. Morning. Swelling enormous but dog happy.

May 4th, 1908. Swelling much reduced. Bandage very loose. Wound dry. Placed animal in metabolism cage. Very lively and happy.

May 9th, 1908. Lobe decreased in size. Very tense, with strong systolic expansion. Left lobe soft.

May 12th, 1908. Pulse decreased. Right lobe apparently decreasing in size.

METABOLISM TABLE.

	Control Dog			Dog 16		
Day of Experiment	Food Gm.	Water CC	Urine CC	Food	Water	Urine
1 (April 24)	114	30	...	204	40	248
2	125	160	262	90	70	122
3	146	175	230	159	359	212
4	156	247	122	171	363	138
5	177	196	219	230	340	234
6	...	112	198	...	350	258
Average	120	153	172	137	254	202
7 Operated upon both dogs.						
8						
9						
10	158	30	...	169	110	...
11	68	98	94	166	354	...
12	208	35	164	295	328	100
13	200	116	252	272	295	250
14	145	106	...	178	377	290
Average	156	77	102	216	293	128
15	116	185	232	337	295	210
16	112	160	258	83	310	356
17	176	190	98	378	330	176
18	200	145	150	166	700	532
19	150	154	...	150	514	534
20	95	225	132	200	432	420
21	...	110	156	...	460	274
Average	121	167	146	188	434	357
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32	40	60	...	123	90	...
33	95	120	...	250	340	214
34	160	155	180	233	450	252
35	216	185	170	175	445	270
36	196	120	215	180	246	178
37	91	30	200	98	290	265
38	...	135	...	...	200	120
Average	114	115	109	151	274	186

The body weights were as follows:

Control Dog.		Operated Dog.	
April 24, 1908	8620 gms.	April 22, 1908	6300 gms.
May 5, 1908	8000 gms.	May 5, 1908	5750 gms.
May 15, 1908	7500 gms.	May 15, 1908	6200 gms.
May 26, 1908	7550 gms.	May 26, 1908	7650 gms.
June 1, 1908	7500 gms.	June 1, 1908	7300 gms.
		Dec. 1, 1908	8900 gms.

TABLE I.

Notes.—The food consisted of cooked hotel meat scraps, gravy, bread and potatoes. Type of metabolism cage used has previously been described. *(The Archives of Internal Medicine*, 1910, V., 234.)

May 21st, 1908. Operated lobe about one-third size of unoperated, and very dense (Fig. 4). Unoperated lobe soft. The animal had been in splendid health and spirits since recovery from the operation, in fact, much less nervous and excitable. Nervous symptoms completely disappeared. Hair is being shed very rapidly (Fig. 5).

November 30th, 1908. Killed by other dogs. Neck chewed and thyroid pierced.

Post-mortem examination: Very large thymus gland. The operated thyroid lobe measured 5x2.5x2 cm.; the unoperated thyroid lobe measured 8x4.5x3 cm. The right lobe was very dense and markedly bilobed, due to a transverse construction which is a little nearer anterior than the posterior end. Posterior division of right lobe slightly denser than anterior portion. Removed specimen from both divisions and preserved in 10 per cent. formalin in 0.9 per cent. Na Cl. Both lobes gave small quantity of clear, viscid fluid on sectioning, but the right lobe least. Left lobe very soft. Anterior half contains cavities that easily admit the index finger, which are full of bloody fluid. Posterior half much denser than anterior, but *much* more flabby than *operated* lobe. Preserved specimens from both anterior and posterior divisions. All specimens were removed from posterio-lateral surfaces of lobe; and one from the anterior end of the left lobe being more from the anterior surface from edge of wound. Posterior end of lobe contained some clearish fluid.

Removed gross specimen from neck, photographed (Fig. 6) and preserved in Kaiserling. Weight of dog 8900 grm. Animal in fine condition.

Microscopical Examination:—The results are shown in Fig. 7, from which it is seen that the structure of the right lobe was the more nearly normal.

Summary:—When the circulation is reversed in the veins of an enlarged thyroid lobe the ultimate result is a decrease in the size of the gland. In histological structure it returns toward the normal. When general symptoms are present, these tend to disappear.

Similar results on size and structure follow simple ligature of the thyroid veins of an enlarged thyroid gland, but the changes are of less degree.

PROTOCOL II.

January 27th, 1909. Ligation of thyroid veins of normal gland. Dog 33. Black and white adult female dog, weight 6 K.

Fig. 2.

Showing the results of reversal of the circulation in the right internal jugular vein upon the right lobe of the thyroid after six and one-half months. At the time of operation, the thyroid lobes were greatly and symmetrically enlarged. The central end of the left common carotid artery was anastomosed to the peripheral end of the right internal jugular vein, both vessels being ligated and divided for the purpose.

Before operation, the dog in addition to presenting the very large symmetrical goitre, was very fat and the coat harsh and much of the hair on the back had been lost. Immediately after the operation the right lobe became greatly enlarged and edematous and showed marked systolic expansion. From this stage the gland rapidly diminished in size and became dense to the touch. Also the general symptoms improved and the coat as well. Gland marked "Normal" was taken from a normal dog of the same size for comparison. (Cf. *Journal of the American Medical Association*, 1908, LI., 1658.)

January 30th, 4:12 p. m. Operation commenced. No difference in size of the thyroid lobes; gland apparently normal.

January 30th, 4:15 p. m. Ligated internal jugular vein on the right side, below the origin of the inferior thyroid vein.

4:23 p. m. Operation finished.

January 29th, 5 p. m. The lobe on the right side is enlarged, being the size of a small walnut. The lobe on the left side is smaller than that on the right side.

January 30th, 2 p. m. The gland is the same as when last observed.

January 31st, 12 m. No change in the gland.

February 2nd, 2 p. m. The swelling has disappeared on the right side.

February 3rd, 1:30 p. m. The right lobe is smaller than the original size (apparently), and is rather firm; the left lobe is slightly larger than

Fig. 3.

Micro-photograph of the thyroid lobe of a dog six and one-half months after operation. The right side of the picture shows the structure of a bit of the goitrous thyroid tissue from the left lobe. The left side of the picture shows the structure of a bit of tissue removed from the right lobe on which side the circulation was reversed in the internal jugular vein. (See Fig. 2.)

the right, seemingly slightly larger than before operation, and a trifle softer.

March 27th. Animal injured in a fight.

March 31st. Animal in excellent condition, except for injuries. Chloroformed and exposed thyroid gland. The right lobe (operated) is about one-fifth smaller than the left (unoperated).

PROTOCOL III.

April 16th, 1909. Ligation of thyroid veins and superior thyroid artery.

Dog 35. White bull terrier, male.

2:26 p. m. Operation commenced. Both thyroid lobes the same size; the gland appears to be very slightly enlarged.

2:30 p. m. Tied the main trunk of the inferior thyroid vein below the lobe on the right side. Separated the gland from its surrounding tissue.

2:34 p. m. The blood in the artery on the right side assumed a venous hue. Tied the superior thyroid artery on the left side, which lay alongside of the lobe.

Fig. 4.

Dog 16. Showing condition of goitre about three weeks after operation. Note the small size of the lobe on the side of the arterio-venous anastomosis (the right) as compared to the lobe on the side of arterial ligation (the left).

2:36 p. m. The right lobe is becoming edematous. Tied main branch of the superior thyroid vein on the right side.

2:38 p. m. The right lobe is somewhat larger than the left.

2:42 p. m. Wound closed and operation completed.

April 18th, 2 p. m. Slight swelling in mid-line under lower jaw.

April 21st, 3:30 p. m. No swelling. Dressed wound.

April 24th. Wound dry and healing nicely.

There is a primary swelling and this may be followed by final decrease in the size of the operated lobe of the gland. Gross anatomical changes in a normal gland following reversal of the circulation in the inferior

thyroid vein are similar for at least six days after the operation though less extensive (Fig. 1). Great variations in the results occur following ligation of the thyroid veins which we believe is due to the great variation in their anastomotic connections. (See Fig. 8.)

In a case where one lobe of the thyroid gland was removed and replaced with reversal of the circulation extensive changes occurred.[3] After a temporary swelling the operated lobe became smaller and more fibrous. The unoperated lobe presented the appearance of a colloidal goitre. New factors are introduced here since there was temporary anemia, perfusion with sodium chloride solution and severance of

Fig. 5.

Dog 16. April 30, 1908. Anastomosed central end of left common carotid artery to peripheral end of right internal jugular vein. Tied right internal jugular vein distal to superior thyroid vein, and ligated left superior thyroid artery. Dog killed by fighting November 30, 1908. Photograph shows condition about three weeks after operation on goitre. Note condition and shedding of coat.

nerves.[2] Ligation of the superior thyroid artery has not given like ultimate results. (See Protocol I. and Figs., Dog 16 and Protocol III.) In another case the arterial supply to one lobe of the gland was decreased by anastomosing the peripheral end of the common carotid artery to the central end of the internal jugular vein, the anastomosis being made below the origin of the superior thyroid artery. This decreased the blood flowing through the superior thyroid artery. On September 26th, 1910, five

years after the operation, the two lobes were compared and the specimens taken. The gland on the operated side was smaller, being 1.5 cm. x 3.0 cm. as compared to 1.5 cm. x 4.5 cm., the size of the unoperated lobe.

Summary:—In general, after reversal of the circulation in the thyroid veins by arterio-venous anastomosis; or after ligation of the veins of one lobe of a goitrous gland, there has been evinced a tendency of the operated lobe to return toward the normal structurally. Also with this, there may occur an alteration in the metabolism of the animal while the general behavior changes toward the normal (the latter being determined by direct observation).

Fig. 6.

Dog 16. April 30, 1908. Anastomosed peripheral end of right internal jugular vein to central end of left common carotid artery. Tied left superior thyroid artery. November 30, 1908, took specimen. Shows relative size of the two thyroid lobes. The serrations in the sides of the lobes resulted from the removal of bits of tissue for histological examination.

Discussion.

From the above results it is clear that such circulatory changes may result in great alteration in the size and structure of the thyroid gland and also in the general condition of the animal. The explanation of these results is not a simple matter. Changes in the size and structure of the thyroid gland have been produced by other means. So it is of interest to mention certain of the results and views of other investigations, in that

they aid in interpreting the results following alterations in the circulation as above reported.

It is obvious at the outset that if there are common factors concerned in all of the various methods of producing changes in the size and structure of the thyroid gland they are more or less obscure, for such changes can be produced in widely differing ways. Under physiological conditions the thyroid gland may become enlarged as at puberty or during pregnancy, and it may become decreased in size in old age. Whether

Fig. 7.

Micro-photograph (retouched) of the thyroid lobe of dog No. 16, seven months after operation. The right side of the picture (to the reader's left) shows the structure of a bit of the goitrous thyroid tissue from the left lobe to which the arteries were tied. The left side of the picture shows the structure of a bit of tissue removed from the right lobe on which side the circulation was reversed in the inferior thyroid vein. Both specimens were taken from the posterior poles of the lobes.

these changes are associated with a disproportion between supply and demand of the thyroid secretion is as yet unknown.

Enormous enlargements of the thyroid may occur without any untoward symptoms of a clinical character, while smaller goitres may be associated with the gravest general disturbance. Many attempts have been made to classify these conditions, but as yet none such has been satisfactory from all standpoints. Microscopical structure has been taken as the basis for such a classification. Accordingly glands of the normal,

hyperplastic and colloid type with varying combinations of colloidosis and hyperplasia have been recognized. But when applied to the symptomatic classification, entirely healthy individuals may present colloid glands and myxedematous individuals or cretins may present glands of similar microscopical structure. Again, symptoms of a nervous character may be associated with very slight degrees of hyperplasia of the glands, not greater than that found in individuals symptomatically normal. Indeed, in one and the same gland can be found areas of normal, colloidal, or hyperplastic structure.

Fig. 8.

Diagrammatic drawing showing veins of the neck of the dog with free venous anastomosis of thyroid veins, and also the vessels ligated at the operation. Though the conditions shown were observed several months after ligation of the superior and inferior thyroid veins, only a slight decrease, if any, in the size of this thyroid lobe occurred. The slightness of the change is ascribed to the free venous anastomosis.

Extensive chemical analyses, while seeming to show a relation between percentage composition of iodine and microscopical structure of the gland, have not been shown to bear such relation to the clinical conditions. While in general the symptoms of exophthalmic goitre are associated with a hyperplastic condition of the thyroid gland, and the symptoms of myxedema are more generally associated with anatomical deficiency, their association is not sufficiently constant to establish causal relations between structure and symptoms.

The relation of gland weight to body weight is equally unsatisfactory as a basis of classification. The condition of the thyroid gland as regards size and structure may therefore only be regarded as a symptom of the more or less general disturbances called exophthalmic goitre, myxedema, and cretinism, and as being by no means pathognomonic.

Perhaps before reaching such a conclusion, the question of the internal secretion should have been considered in the light of present knowledge of the thyroid gland in its relation to the organism as a whole. Hypo- and hypersecretion have been ascribed as causes of the conditions called exophthalmic goitre, myxedema and cretinism. That the thyroids have internal secretions necessary to the normal activity of the organisms possessing them is concluded from observations too well known to need mention. Such a far-reaching conclusion without modifications is unwarranted. The universal occurrence of the thyroid structure in all vertebrates, certain of the results reported following extirpation of the thyroid gland, *i. e.*, myxedema and death, and the improvement of cretinoid individuals with atrophic glandular condition when fed with preparations of the thyroid gland are ordinarily quoted as indicating such an internal secretion. The universal occurrence of this structure is not reason a priori that this gland is essential to life. For the occurrence of certain appendages (ears) are equally widespread and obviously not in this sense essential to life. In man, total removal of the thyroid was practiced by Swiss surgeons who record "operative myxedema" in only a certain number of such cases. With monkeys Horsley, and Murray and Edmunds, have stated that they were able to induce myxedema. But Vincent was unable to obtain such results. Rats and guinea-pigs, according to Vincent, do not seem to suffer at all from removal of both the thyroids and parathyroid glands; cats and dogs frequently suffer and die, but not invariably; while in foxes, death comes on comparatively early. Schiff in 1856 and later in 1884 reports death following total extirpation of the thyroid and parathyroid gland in dogs; while in foxes, which were apparently the most prone to exhibit ill effects after thyro-parathyroidectomy, Carlson and Woelfel have removed these glands with by no means such dire results. In one experiment the fox so operated was normal one and one-half months after the operation, at which time it was killed. Post-mortem examination revealed no thyroid or parathyroid tissue, although thirteen suspected glandules were sectioned and examined. In agreement with others thus far in our own observations on chickens and pigeons, total extirpation has not induced a fatal ending. Lanz reports slower development and depressed laying power in a thyroidectomized hen. In no animal, including monkeys, was Vincent able to induce symptoms of myxedema.

In view of such results, the subject presents many difficulties in the way of its solution. While the absence of untoward symptoms following total extirpation is not proof that the gland does not normally functionate

beneficially to the animal, it is unwarrantable to conclude that such a function is absolutely indispensable to life, or even a comfortable state of health. Unfortunately broad generalizations have been made from specific experiments.

These considerations are of value when we consider, as previously mentioned, the theories based on thyroid secretion of exophthalmic goitre, myxedema and cretinism. The current general conception has been that the symptoms of exophthalmic goitre were due to a hypersecretion of the thyroid gland. This is based on the fact that excessive thyroid administration may produce nervous and circulatory symptoms similar to those of exophthalmic goitre. Removal of portions of the gland, however, has failed to permanently improve or cure such conditions. Moreover, the nervous and circulatory disturbances following excessive thyroid administration are not the entire picture for metabolic changes are also induced by such procedure.

As opposed to the view of hypersecretion, are the reported results of improvement of the symptoms of exophthalmic goitre and return of the gland structure toward normal, after feeding thyroid gland to such patients. It is believed by Marine and Lenhart that "glandular hyperplasia as a physiological reaction is due to a deficiency," and that in exophthalmic goitre there is physiologically a hyposecretion of the thyroid gland. The hyperplasia of the gland found in such cases is supposed to be a compensatory hypertrophy. With this view would accord the result of Halsted on dogs and Hunt on guinea-pigs, who reported congenital hypertrophy of the thyroid glands in the offspring of thyroidectomized mothers. Edmund's results only doubtfully confirm those of Halsted, while the results of Lanz on dogs and goats are contradictory.[4] The large percentage of goitres in dogs, the etiology of which is obscure, makes it hard to ascribe specific causes to the results of congenital hypertrophy as above reported, especially in the presence of contradictory results.

Based on such observations, Hoskins[4] studied the congenital effect of hyperthryoidism by feeding pregnant guinea pigs with thyroid gland. While there was an average depression of 56 per cent. in the gland weight to body ratio, the maximum ratio of gland to body weight is the same for the experimental and control animals. The structures of the normal and experimental glands were the same. The bearing of these observations on experimental "congenital hyperthyroidism" are necessarily obscure. It is of interest to mention the observations of this investigator upon the thymus in such animals. He reports an average hypertrophy of 38 per cent. of the thymus gland under the conditions of his experiments. We have not made extended observations upon this gland in connection with alterations of the circulation, but in dog No. 16 we noted a large thymus gland at post-mortem. (See Protocol I.)

To return to the theory of hyposecretion as an explanation of the

symptoms of exphthalmic goitre, no such symptoms may follow total extirpation of the gland in a patient previously free from these symptoms. Similarly myxedema cannot be unqualifiedly ascribed to hyposecretion, for although myxedema has followed extirpation of the thyroid gland, this is not always the case. No such quantative theory of secretion will harmonize the evidence presented. And as Carlson and Woelfel have expressed it "the etiology and symptoms complex of exophthalmic goitre in man is too complex for any one theory so far advanced."[5] It should be borne in mind that many of the statements found in the literature were based upon experimental operations performed before the days of aseptic surgery and that many of those performed at the present day upon animals are done under conditions which would be considered criminal, from a bacteriological and surgical standpoint, if applied in human surgery. This recalls to mind the variability of surgical results before days of modern methods.

In view of the indefinite state of present knowledge of the activities of the thyroid gland, it is not surprising that little is known of the mechanism of its action, and it would, therefore, be out of place to enter here into a lengthy discussion of this phase of the subject. But as we are considering conditions which may alter the structure of the thyroid gland with the hope of correlating such changes with those we are herein reporting following alteration of the circulation; and as the administration of thyroid substance and iodine compounds are reported to induce changes in the gland, some of the results bearing on the question of internal secretion will be presented.

For years before the discovery of iodine, certain sea animals and plants containing iodine were used medicinally in cases of goitre. Long ago it was observed that the size of goitrous thyroid glands were sometimes reduced by the administration of preparations of iodine. Similar results were reported following administration of the thyroid gland, as also following administration of iodothyrin. These results led to the view that iodothyrin was the active principle of the internal secretion of the thyroid gland. At present the trend of opinion seems to be that the colloid contains the active internal secretion and, quoting Marine and Williams, "that the physiologic activity of the (colloid) thyreoglobulin is dependent upon the amount of iodine contained in organic combinations."[6] The view that iodothyrin was the active principle of the internal secretion was based on results showing the absence of symptoms following thyroidectomy when idothyrin was administered. Some investigators were unable to confirm these results. But E. Wormser reports that he could prevent the attacks of tetany and preserve the life of the animal for a long time by administering the whole gland. The contradictory nature of the results following thyroidectomy as previously discussed, render conclusions impossible from the above work. The exact relation of iodine to the activity of the normal gland is not unquestionably established. The question of

iodine relation to structure of pathological thyroid glands has been extensively investigated by Marine and Williams,[7] who in the summary of their results state that the iodine content varies inversely with the degree of hyperplasia. They think that the internal secretory value of the colloid varies directly with its richness in iodine. Then in terms of iodine deficiency it would seem that the condition of exophthalmic goitre would be one with the greatest deficiency of iodine per unit of gland tissue. It is interesting to note, however, that in both colloidal and hyperplastic types of goitre, the total iodine or the ratio of iodine to body weight is usually greatly increased, while normal glands have been examined that showed at most only a trace.

As regards the changes in the gland and general symptoms following the administration of thyroid gland or iodine compounds in goitrous conditions the results by no means indicate that the cause is primarily a change brought about in the nature of the internal secretion of the gland itself. It is true that the iodine content of the gland may increase along with changes in the structure and general symptoms, but to ascribe to the secretions the primary cause of the change would be no more warranted than ascribing the beneficial effects of iodoform to a wound when locally applied, to altered thyroid secretion. For the local application of iodoform in such conditions may increase the iodine content of the thyroid gland.

On the hypothesis that the internal secretion of the thyroid gland was to be found in part, at least, in the lymph, Carlson and Woelfel[8] made studies upon the lymph of animals hoping to detect the thyroid secretion. Assuming that the active principle of the internal secretion was the iodine containing compound they analyzed goitre lymph for iodine, but were unable to detect it. They then made use of the aceto-nitrile test of Hunt, who showed that the resistance of mice to aceto-nitrile was increased by thyroid feeding, while the resistance of rats was lowered. Of course, it must be first shown that the substance or substances in the thyroid gland responsible for the tolerance to aceto-nitrile are identical with the internal secretion. Hunt has shown that other compounds of iodine may likewise increase the tolerance of mice to aceto-nitrile. Also, though to a lesser degree, extracts of other organs give similar results. However, the aceto-nitrile test gave negative results when applied to the goitre lymph by Carlson and Woelfel. Neither iodine nor microscopical structure, according to Carlson and Woelfel, afford an adequate basis for classification of thyroid disturbance in man. For they say, "if the histological structure and iodine content of the thyroid are true indices of the physiological states of the gland, and these are casually, directly or indirectly, related to the symptoms of cretinism, myxedema, and exophthalmic goitre, we ought to find these symptoms in goitrous dogs" since the same parallelism exists between structure and iodine content as in man. But such symptoms are at least rare.

By way of summary it may be said that we do not know the nature of the internal secretion of the thyroid gland. Furthermore, we are unable to explain the change occurring in the thyroid gland following administrations of thyroid preparations or iodine compounds. And subsequently are unable to apply such results to an interpretation of the changes following alteration of the circulation.

There are indications that the relations of the thyroid gland are very broad so, possibly, we should not look to the gland alone for an interpretation of the changes produced. Although the thyroid and parathyroid glands are by many considered as distinct, the observations of Vincent and Jolly and others show that the parathyroid may be transformed into typical thyroid tissue (as regards structure) after extirpation of the thyroid, and many examples of follicular structure and colloid in the parathyroid glands are cited. The statements that tetany and death result when the parathyroids are removed would seem to speak against the entire assumption of parathyroid function by the thyroid gland after parathyroidectomy. The statements regarding parathyroidectomy are even more confusing than those regarding thyroidectomy alone. Some experimenters have claimed to observe death as a result of parathyroidectomy, while others report the non-occurrence of such results. The problem is even more perplexing because of the minuteness of the quantities of parathyroid tissue which have been reported to have warded off the usual consequences of parathyroid extirpation. To sum up the results of parathyroidectomy, in the hands of some observers tetany and death have ensued in rapid succession after this operation. Other investigators have removed the parathyroids without the invariable occurrence of such symptoms; recovery in certain cases being complete. It has been stated by some of those who have obtained tetany and fatal results as a consequence of parathyroidectomy that such results might be prevented by calcium administration or transplantation of parathyroid tissue. Others have questioned the interpretation of the results obtained after calcium administration in such cases claiming that the symptoms of tetany were intermittent in character and that they frequently stopped in an unaccountable manner and recovery followed. Of interest in this connection are the observations of Thompson, Leighton and Swarts that *operation alone* on the tibia markedly influenced the tetany parathyropriva even after the dog had developed severe symptoms. From the above it is clear that the relations of thyroid and parathyroid to each other and to the organism as a whole are as yet not established.

Another indication of the broader relations of the thyroid gland is indicated by the results of Carlson and Jacobson who found the ammonia content of the blood to be increased in cats and foxes after complete thyroidectomy, together with depression of the ammonia destroying power of the liver.

Other indications are not rare of such broader relations of the thyroid

structure. The reported hypertrophy of the hypophysis after thyroidectomy, as also in many diseases of the thyroid and the changes in the hypophysis in certain constitutional conditions; the retarding action of thyroid preparations upon the carbohydriated destroying mechanism of the body; the reduction of the tendency toward ether and adrenalin glycosuria after thyroidectomy; the observations that 86 per cent. of the myxedematous subjects are females; and the reported anomalies in the development of chicks hatched from eggs laid by thyroidectomized hens, indicate that there may be relations of the thyroid which are as yet unsuspected.

From the foregoing it is seen that little is to be obtained from the enormous literature on thyroid which will help in interpreting the results obtained by alteration of the circulation in goitre. An hypothesis ascribing such changes to a primary alteration of the secretion of the gland, would be hard to construct on the basis of the facts at hand.

In considering the results following alterations of the circulation from the standpoint of glandular changes following such procedures, it is not implied that the primary glandular changes are initiating causes of the general results observed. While it is possible that the primary changes produced by reversal of the circulation in some of the veins of the thyroid gland, as was done in dog No. 16 (p. 168), are responsible for alterations in the general metabolism and the general improvement observed, such a conclusion is by no means warranted. But to entertain for a moment the hypothesis that it is responsible for the change produced, we might consider that the symptoms of nervousness and metabolic disturbances observed before the operation in this dog were due, say, to a hyposecretion of the thyroid. Not that the thyroid gland was giving off a less amount of internal secretion than normally secreted by the gland, but that there was a state of hyposecretion in the sense that the demands for this secretion were greater than normal. Reversal of the circulation might then be considered as meeting the demands by augmenting the amount of acting thyroid secretion per unit of time and in this way temporarily correcting the deficiency, the immediate results instituting a permanent beneficial change.

The metabolic changes and changes observed in the general condition of this dog are interesting, whatever be their cause. For a parallelism seemed to exist in this animal between glandular changes and the clinical symptoms which were of the character of exophthalmic symptoms frequently observed in man, but very rarely in dogs. Other hypotheses could be advanced, but we merely cite one as indicating the possible broad changes which could be conceived as resulting from circulatory alteration.

Turning to the local causes of the structural changes occurring in the gland itself after circulatory alteration, we will consider them from intra- and extravascular standpoints. The intravascular changes including such phases as anemia, hyperemia, functional activity as related

to blood supply, capillary pressure, rate of flow; and the extravascular changes comprising edema, tissue respiration, and survival and functional activity under altered extravascular conditions.

Intravascular Considerations.

The circulatory alterations which we have produced in goitre have brought about, so far as immediate results are concerned, three distinct conditions. Namely, partial anemia alone, as when the artery to a gland is ligated or when the blood pressure in the parent artery (carotid) is reduced by anastomosing the peripheral end of this vessel to the central end of the internal jugular vein; partial anemia with congestion, when the thyroid vein or veins are ligated; and hyperemia with reversal of the circulation when an arterio-venous anastomosis is made with the inferior thyroid vein or parent vessel. Anæmia then occurs in the first two conditions but not in the last. Partial asphyxiation of the tissue elements as a consequence of anemia, is therefore an early factor in the production of the noted changes. Asphyxiation is also very probably a factor in the production of the changes noted after arterio-venous anastomoses. But it is probably more largely due in this case to the extravascular changes, such as edema, which will be discussed presently. We have defined anemia from the standpoint of physiological blood supply, which is considered to be an adequate blood supply for the functional state of the tissue. The factors concerned are quantity of blood to unit mass of tissue, per unit of time, and the state of tissue demands. While occlusion of the veins would produce a congestion and in the pathological sense a passive hyperemia, there would be a partial anemia in the sense that the arterialized blood supply per unit of tissue per unit of the time would be reduced. Also there might follow an increased tissue demand through asphyxial stimulation.

The exact immediate conditions produced in the tissues by such procedure as ligation of vessels, or the effects of rapid severe edema are little understood. While the degree of anemia produced would on the whole vary directly with the degree of circulatory obstruction, transient conditions might occur in the smaller vessels producing varying anemic and asphyxial states not indicated by the primary circulatory obstruction. For example, the partial anemia induced by the vascular ligation might, by the stimulating action of asphyxia upon the arterioles and even the capillaries, cause a greater degree of anemia by the contraction of these vessels. This would introduce the question of the relative resistance of tissue elements to the adverse conditions of asphyxia as also the ultimate survival of tissues, under the varying degrees of anemia that might be produced. But this is considered below.

In considering the results following simple ligations of the superior thyroid artery, as was done on dog No. 16, herein reported, from the standpoint of anemia it is first necessary to know the relation of blood

supply to demand. Since we have used partial asphyxia to explain the results following circulatory alterations, and since partial anemia might be inferred to have occurred in the left lobe of the gland of dog No. 16 as a result of ligation of the superior thyroid artery, the question arises, why no such diminution of the size and change in character of structure occurred in this lobe, as has occurred following ligation of the thyroid veins. A notorious fact is that the blood supply to goitrous thyroid glands is greatly increased. And as the minimum quantity of blood supply which would suffice to maintain a continued state of the goitrous activity is not known; the degree to which the blood supply could be diminished without producing glandular changes is not known. So when the artery is ligated it is impossible to say whether a partial anemia is produced. For we are ignorant of one of the factors. Where the vein or veins are ligated the condition is not the same for the factor of edema and its dependent results is introduced. Furthermore, the ligation of the superior thyroid artery may not have produced a sufficient degree of asphyxiation to lead to the production of a sufficient quantity of disintegrative products necessary to induce the inflammatory changes accountable for the glandular reaction, as elsewhere discussed; or in the absence of edema (present when the veins are ligated) such disintegrative products if formed may be too rapidly removed to bring about this inflammatory reaction, neither the lymphatic nor venous channels being interfered with.

The condition of partial anemia may be further augmented by the partial occlusion of the capillaries as a result of increased extravascular pressure produced by the edematous condition. The factor of anemia is probably of importance in the extravascular processes which it inaugurates either directly by producing anemia of the tissue cells; or indirectly through injury to the vessels themselves rendering them more permeable and thereby augumenting the onset of the edematous state, the effect of edema being the same as that produced by anemia, *i. e.*, asphyxia.

In a goitrous gland already hyperplastic, the beneficial results to be derived from the production of an active hyperemia might be doubted. Based upon the results obtained by severing the vasomotor nerves to a part, and thus increasing its blood supply it might be anticipated that the production of an active hyperemia would give rise to a further hyperplasia. But it is easy to thus fall into error. For example, if the vasomotor nerves to a part be cut, the vascular channels will dilate and a greater quantity of blood will flow through the part. Greater growth has been observed under such conditions. But although the existence of specific trophic nerve influences is doubtful, if not disproven, it is still possible to object to these results as being due directly to the increased circulation as it might be due to some change set up in the tissues themselves by cutting the nerves. For when such nerves are sectioned, fibres other than vasomotor fibres are severed.

Assuming that no such nervous trophic influences are concerned in the phenomena, it by no means follows that the result is due to a better nutrition of the part from the presence of a greater circulation. That is, one cannot conclude that the growth of a tissue may be augmented by merely supplying it more abundantly with blood. For in meeting conditions necessary to accomplish this, an abnormal state of the capillary circulation is inevitable. And it is possible that this in itself acting either directly, as by pressure upon the tissue elements; or indirectly, through changes taking place within the capillaries themselves resulting in an alteration of the normal function, might result in stimulating the tissues to greater activity. For example, such a hyperemic state is usually if not always accompanied by an increased pressure within the capillaries. This condition might favor the passage of substances used by the tissues out of the blood more than it would favor the entrance into the blood of waste products from the tissues. Thus the accumulation of waste products might serve as a stimulus to the tissues; and an abundance of food materials being supplied at the same time, it is conceivable that hypertrophy might result.

Again it might be urged that owing to the greater amount of blood flowing through the part, the temperature of the part would be increased. And owing to the increase in temperature the tissues might manifest a greater activity. That this last view may be the key to the explanation is indicated by the fact that some of the best observations of this character have been made upon external structures, such as rabbits' ears and cocks' combs where the actual increase in temperature may be considerable. For if such an experiment be performed upon the ear of a rabbit, a very marked difference in the temperature of the two ears will be observed even by feeling with the hand.

But reversal of the circulation in the veins of the thyroid gland does more than increase the flow of the blood. So while hyperemia is a factor in the production of the end results it acts indirectly. When the central end of an artery is anastomosed to the peripheral end of a vein the result is that in the venous portion of the vessel, the direction of the circulation is the reverse of the normal; the pressure is higher; and the blood is arterial. The pressure in the capillary area normally drained by the vein will be increased. For not only has the vein ceased to transport venous blood away from the capillaries, but it has engaged in conveying arterial blood to them. So the capillary pressure is raised not only by the damming back of the blood by the vein having ceased to convey venous blood (passive anemia); but by the vein leading more blood into the part, the pressure in the capillaries is further augmented. Some of the blood sent back through the vein no doubt may reach unobstructed venous trunks through direct anastomotic connections. And these quickly respond to the new conditions and rapidly enlarge to accommodate more blood in passing to veins returning to the heart. So the greatest increase

in capillary pressure due to the reversal of the direction of the circulation in the vein would be observed shortly after the operation. And experimental observation bears this out. For when the central end of one common carotid artery is anastomosed with the peripheral end of the inferior thyroid vein on the opposite side of the neck, the effect upon the circulation in the gland is immediate and striking. This is observed particularly if the gland present the condition of well marked goitre, that is, if it be markedly enlarged and the blood vessels prominent. (See Protocol of Dog 16.) On occluding the vein preparatory to division and anastomosis with the artery, the gland may swell somewhat and become purplish; that is, present the appearance of passive anemia or engorgement with venous blood. But very quickly after the new circulation is established, it not only becomes greatly enlarged in size and the blood vessels become more engorged, but very red or arterial in hue. The possible increased rate of flow through the capillaries may interfere with the metabolism of the cells which derive their nutrition directly from the blood stream, *i. e.*, the intimal cells of the blood vessels; or the increased capillary pressure may in some way interfere with the normal metabolism of the capillary endothelium or may mechanically injure this structure. At any rate evidence is shown that the normal properties of the capillaries are affected by the passage of liquid from the blood through their walls into the surrounding tissues, producing the phenomena of edema.

Extravascular Considerations.

As to the interpretation of the changes which affect the extravascular tissues, they are in part explainable from the changes within and affecting the blood vessels and also in part to the extravascular conditions established as a result of the circulatory derangements. It is impossible with our present knowledge to enumerate in detail all of the factors involved. But it is nevertheless interesting to consider certain factors which undoubtedly play a rôle in the production of the extravascular phenomena. Thus as a result of the increased capillary pressure the tissues become edematous. That is, they become infiltrated with liquid. The flow of this liquid being chiefly in one direction, namely, to the tissues, the conditions for return of tissue metabolic products are unfavorable. This would lead to an abnormal concentration of such substances in the tissues. Since it is known that the functional activities of tissues are harmfully affected even to the point of extinction of vitality in this way, we have a theoretical explanation for the interpretation of the changes observed. Also the same condition results in an increase in the extravascular pressure upon the tissues and this, too, in all liklihood may affect the activities of the tissues in the same direction. Reducing the interpretation to terms of respiration in order to simplify the conception, these conditions would result in an asphyxial state in the tissues. And in line with what is known regarding the relative susceptibility and resistance of tissues to

such an adverse condition, we have a rational explanation of the tendency of the tissue elements to later present more normal morphological characteristics. That is, it may be assumed that the abnormal tissue elements are less resistant to the adverse condition than are those which are more nearly normal. Therefore, the more nearly normal elements would from this standpoint be expected to the better survive the adverse condition.

Bearing directly upon this point is a consideration of the nature of the abnormal tissue elements. For if it is assumed that the abnormality is developed in cells arising primarily as normal thyroid tissue elements, and this seems the most rational conception, then it would seem that the more nearly normal cells of the thyroid tissue would be the younger. Now since it is well known that in general the ability of a tissue element to withstand or survive an adverse condition is in inverse proportion to its age, it follows that cells of the thyroid surviving such treatment would be of the younger type. This view harmonizes with what is said in the preceding paragraph.

Another consideration is the possibility of a greater susceptibility of abnormal elements to the action of substances of the liquid extravasated from the blood vessels. But since nothing definite is known upon this point, and since its interpretation would in the broad sense be from the standpoint of interference with the respiration of the tissue elements, it is unnecessary to consider it further.

Another possible factor would be in connection with the possible and even probable stimulating action upon the tissue activities, thus causing an increase in the production of internal secretion. But since the question as to whether the general symptoms are due to a hypo- or hypersecretion or to some condition outside of the thyroid apparatus, is so unsatisfactorily answered it would be unprofitable in this place to pursue the view further.

The final results as regards the ultimate glandular changes on the whole depend upon the extent of the initial circulatory alteration. As shown in Fig. 8 after ligation of the inferior and the superior thyroid vein there was at most a very slight decrease in the size of the operated lobe. This figure illustrating the venous supply of the thyroid gland in this animal, shows that the operated superior thyroid vein had a very large anastomotic connection distal to the ligature and also that the thyroid lobes were connected by an isthmus. Both of these structures would render collateral circulation possible, which would tend to prevent the establishment of the desired initial circulatory change.

Generally speaking, the results obtained from ligation of the veins depend upon the extent of primary venous obstruction. This in turn affects the tissues concerned in a way similar to the action of asphyxia in other tissue, the results "depending upon the given state of metabolism when the nutritional change is made, and the extent of the nutritional change in the given condition," as discussed by us in the relation of asphyxia to the central nervous system.

Summary of Discussion of Circulatory Alterations and Remarks.

It may be said that the change may be rationally interpreted from the standpoint of primary interference with the respiration of the tissues, which results in the death, disintegration and disappearance of abnormal tissue constituents. Also, accompanying the secondary effects due to the reactions of the tissues, absorption is probably increased so that the abnormal substances are quickly removed from the gland which accounts for their rapid disappearance. The more nearly normal tissue elements being more resistant or perhaps more favorably situated to survive, under the more nearly normal circulatory conditions established through the reaction of the tissues to the adverse condition, which indeed is strikingly similar to the current conceptions of an inflammatory reaction, resume and retain a more nearly normal function.

As to the reaction set up in the tissues, it is explainable as being due to the edema. But this in truth may be only the indirect cause, for the accumulation of metabolic products together with substances originating from the death of tissue elements would probably act either together or the latter alone, more directly in producing an inflammatory reaction.

On the whole, the results indicate that general symptoms of goitre are at least in part associated with deranged functions of the thyroid apparatus. The evidence may perhaps be considered as more conclusive from clinical observations. For it is well established that amelioration or even disappearance of general symptoms may in certain cases follow surgical operations. Also such results are known to follow local treatment of pathological thyroids such as an injection of carbolic acid. Similarly the results reported following ligation of the thyroid arteries, and more recently, as herein stated, the amelioration or disappearance of general symptoms following ligation of the veins as practiced by the writers, or by the senior writer with Dr. Alexis Carrel, with division of the ligated vein distal to the ligature and anastomosis of its peripheral end to an artery so that the vein transmits arterial blood to the gland. The results of the operation of tying the veins were studied by Professor Herman Tuholske, after which he performed an operation upon a human patient with good results. Following the publication of this work, Werelius[9] repeated the operation with the modification that he tied the vessels by means of purse string sutures introduced beneath the capsule of the gland, and confirmed our results particularly as to the decrease in size of such operated glands, together with changes in structure. He also operated upon a human being in the same manner and from which he reported good results.

It is interesting to note the absence from Werelius' report of histological results of the tissues of such operated glands, or any mention of even a relative increase of the fibrous tissue as compared to the condition before operation or to the unoperated lobe, such as we have observed.

Indeed with us in most cases there has been strong evidence that such fibroses are not only passive but of an active nature. We think, therefore, that the failure of Werelius to observe this must have been due to an oversight, for his published photographs of such glands show that they markedly recede toward normal size, which in itself would certainly indicate at least a relative increase of fibrous tissue as compared with the tissue before operation. For it is known that fibrous tissue is very persistent, therefore it is highly improbable that it would disappear during the contraction of the gland.

From our results, though cases presenting marked general symptoms are not numerous, which is in agreement with the statement made that the occurrence of such general objective symptoms in goitrous dogs is comparatively rare, the evidence speaks for the occurrence of such symptoms as being due at least in part to the deranged thyroid. For such animals as have presented general symptoms have always shown an amelioration or disappearance of such symptoms following operations upon the thyroid veins. But it must be remembered that operative procedures in general themselves may lead to such results in this as in other pathological conditions. The explanation of these results therefore remains obscure.

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ABDOMINAL PAIN.

By Howard A. Kelly, M. D., of Baltimore,
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The art of diagnosis in abdominal affections consists in a large measure in the solution of the question which organ gives rise to the pain of which the patient complains. Aside from tumors large enough to cause a decided swelling of the abdomen at some point, it is usually pain that drives the patient to the doctor, and the physician is successful or unsuccessful as he is able to determine sooner or later that the pain complained of arises from a disease in this or in that particular organ.

In a broad sense it is true that when any organ is seriously affected, pain is apt to be felt in that part of the abdomen in which the organ is located, and is indicated by the patient placing her hand over the spot, or as is sometimes done, by pointing to it with a finger. Very rarely does the patient complain of pain on the left side when the disease is situated in the right. It sometimes, however, happens, as is well known, in appendicitis. Once in a while, a patient with disease in the right kidney complains of a pain in the left side.

The pain question is not always an easy one, for three reasons: In the first place, the pain may be felt at some distance from the painful organ; (reflex pain); in the second, the patient is often only able to indicate vaguely the location of pain; and in the third place, on the right side there are at least eight different structures which, to my certain knowledge and in my experience, may be confounded one with the other.

Let us glance for a moment at a diagram showing the location of the organs likely to give rise to pain. Leaving out the intestines and the pains rising from a temporary indigestion, these organs are largely located peripherally or around the contour of the abdominal cavity, taking the umbilicus as a centre, and it is in one or the other of these organs that we seek, as a rule, to locate any particular pain.

Patients will sometimes indicate quite precisely the region in which the pain begins, but if the pain becomes more intense and diffuse, the indications are not so valuable.

A pain fixed in one spot almost always means some demonstrable lesion, so that even when a hysterical patient complains of a particular pain always in a particular spot, I always investigate most carefully and try to find some definite cause. Pains which are purely functional or neuropathic in character are apt to be complained of more or less vaguely as burning or migratory and felt in other parts of the body as well; often

they cause the sensation of something moving inside, like a worm or an infant, one of my patients took sixty dollars worth of worm medicine from a quack, so sure was she that she had a worm bothering her.

The study of the question of pain as an aid in making a diagnosis is such an important one that I have been giving it the closest attention for some time past. I would advise physicians in general to follow somewhat the lines laid down in this brief paper on account of the educational value of the study.

Fig. 1.

The diagrammatic sketch shows the location of pain, especially in the lower part of the abdomen, and shows how easy it is to confuse the pain of one organ with another.

K, marks the point of kidney pains.
G. b., gall bladder.
P., pylorus.
St., stomach.
V. a., vermiform appendix.
Ur., ureter.
S. i., sacro-iliac joint.
S. R., sigmoid flexure.
Ut., uterus.
F. t., Fallopian tube.

In the first place, it is a good plan to outline the area of pain on the surface of the body in ink, as suggested by Philander Harris in the transactions of the American Gynecological Society. This has the advantage of causing the physician to delay for a longer study of important symptoms, as well as of fixing the picture well in his mind. For the sake of further comparison and study these skin-records may be transferred to gauze and filed away; or perhaps simpler still, be photographed down and filed, as I have been in the habit of doing lately, in a special book with all necessary references to the history of the case.

The next step in the diagnosis of pain is to attempt to reproduce the pain by pressing upon the organ. This is of course habitually done in

attempting to make a diagnosis of chronic appendicitis, and in gall-bladder and duodenal disease.

It is important also to avail oneself of this method by pressing deep down upon the kidney, by picking up and handling bimanually the uterus, the uterine tubes and the ovaries, asking the patient in each instance if the pain caused by pressure is or is not exactly the same as the pain complained of. I have even carried this method so far in difficult cases as to open the abdomen, or make a large retroperitoneal incision under local anesthesia, so that by handling the various structures one by one, with the patient fully conscious, I could then discover which one gave rise to a like sense of pain. This is a step of utmost value in patients who have had a definite, fixed pain which has hitherto resisted all our diagnostic acumen.

Another way to recognize and differentiate pain on the right or on the left side, consists in catheterizing the ureter and injecting fluid into the pelvis of the kidney sufficient to bring on a mild renal colic. A large percentage of all the vague pains in right or left side, especially those in which the patient grasps the loin between thumb and fingers to show where she feels the pain, are due to a displacement or an obstruction in the upper ureter. Such a patient almost invariably decides at once with the utmost definiteness that the pain thus created is the same, or is not the same, as that of which she complains. (See on this subject a valuable paper by Edward H. Richardson.) It is as a rule easy, if the kidney sources of pain can be eliminated, to decide that the organ which causes the pain is then either in the upper or in the lower part of the abdomen, thus eliminating further inquiry to an investigation of the smaller group.

If great care is thus taken in investigating pain, in reproducing it, and in finding its habitat, we will be less liable to do unjustifiable operations in the future. I have repeatedly seen, and every active surgeon has seen patients who have had their appendix taken out, their tubes and ovaries ablated, and kidneys or bladder operated on, while the seat of the disease was subsequently proved to be an organ other than that subjected to the operation. I have even seen patients who have had as many as two and even three useless operations done in this way.

There is one source of pain, and an important one which it behooves the surgeon always to be looking for, and that is that one due to loose sacro-iliac joint, first discovered, investigated and heralded by Joel E. Goldthwait of Boston. (*Boston Med. and Surg. Jour.*, 1905, pp. 593, 643.) This pain is apt to be associated with more or less severe backache, generally on one side over the sacro-iliac joint. It sometimes extends through to the front of the joint where it is most apt to be mistaken for an affection of some pelvic organ. It can, as a rule, be demonstrated by a shortening of the affected leg and by rotating and forcing it strongly or by pulling it outwards. In other instances the reasoning is more by exclusion. The therapeutic test is a valuable one as most of these patients are relieved by a strong bandage made like a surcingle.

TUBERCULOSIS AS IT CONCERNS THE PHYSICIAN.

By Lawrence F. Flick, M. D., of Philadelphia.

For the physician, tuberculosis is a two-sided problem; the one side being that which concerns him as a citizen, and the other that which concerns him as a physician. The side which concerns him as a citizen is the sociological one. This has to do with the prevention of the disease by public enlightenment, by social reform, by re-adjustment of the customs and habits of life to correspond with modern ideas of sanitation, by an organized effort for philanthropy and investigation, by legal enactment, and by governmental control and governmental aid. This side of the problem has received much public attention in recent years and has been more diligently worked out by physicians than by any other class of citizens. What the physician has done along these lines speaks well for his altruism, for it is against his personal interest, and in a sense takes the bread and butter out of his own mouth and the mouths of his wife and children.

The other side of the problem, namely, that which concerns the physician alone, has unfortunately received less attention, and this, perhaps, puts the physician in a bad light as regards sagacity, because it is a side which might be made very profitable to him without prejudicing the public interest. It is the physician's function to prevent disease in the individual; to cure it in the individual when it has occurred; and when disease cannot be cured, to alleviate the sufferings of the stricken one; and in the exercise of this function lies the physician's sole opportunity for remuneration.

At all times, from the dawn of history, the highest function of the physician has been to guard those who entrust themselves to his care against the enemies of health, whether they come in the form of licentiousness, dissipation, or disease, and for this service, mankind has always been willing to return a good compensation in both money and esteem. No man has ever been held in higher esteem in the world than he who could protect against inpediments to health, who could ward off death when disease had broken through the lines of protection, and who could give relief from pain and disquietude. The world has bowed before him and even kings have honored him.

Next to prevention, cure of disease is the most important function of the physician, and in these modern times when so much can be done for the cure of disease, this function has a greater value than it has ever had in the history of man. In the past, cure of disease was more a matter

of pretence than of accomplishment. People got well in spite of disease and the doctor, and frequently, the doctor took the credit for what nature had accomplished in spite of his interference. Whilst there is still much of this pretence and still a great deal of bungling interference with nature's laws, the physician nowadays by wise guidance and even sometimes by direct methods can really bring about favorable results in diseases in which, formerly, only unfavorable results could be looked for.

The other function of the physician, namely, the alleviation of suffering, is only secondary and should always be kept in the background, but, unfortunately, is sometimes thought too much of. From a human point of view, it is perhaps the most attractive, both because the results of its administration are dramatic and because it appeals to sentiment. It is a dangerous function, however, and one which, more than any other thing, has trammeled the progress of scientific medicine and kept individual physicians, indeed the majority of all physicians, in the quagmire of mediocrity. The power to ease the sufferings of a fellow human being is so seductive that it constantly leads physicians to do things which, if fully analyzed and shown up in all their influences, would often reveal a broken thread of life which might have held out a while longer had that relief not been sought and given.

In no disease in the whole field of medicine has the physician a better opportunity of increasing his value to himself and his usefulness to others than in tuberculosis. In no field can he give a better return to his clientele for the money which it pays him, and in no field is the money more willingly paid. Exact, accurate knowledge of the prevention of tuberculosis is at present highly appreciated by every one, and intelligent help towards recovery is prized and gladly paid for by every victim of tuberculosis. What the public thinks about such advice and assistance and the value which it places upon them is indicated by the millions of dollars which it pays to quacks and mountebanks for things which have no value but which are held out in the limelight of advertisement as capable of accomplishing the results which are desired.

Few physicians appreciate and realize that there is both a duty and an opportunity for them in the prevention of tuberculosis. They have been so accustomed to think about the matter in the light of public duty and in association with philanthropy and sociology, that they have forgotten what belongs to themselves. The medical profession as a body, through physicians as units of that body, has it in its power to immediately control the spread of tuberculosis and to collect a good revenue from the public for doing it. Of course, this is only theoretically true, but it might be practically true if all physicians had the proper knowledge, training, and disposition to exercise the power which they theoretically possess. In the light of our present knowledge, every tuberculous subject who has become contagious can be made non-contagious through certain practices which are within his ability and which usually, with the assistance

of available philanthropy, can be brought within his financial reach. Were every tuberculous subject made non-contagious, no new cases would spring up and the disease would become extinct with the termination of the cases now in existence. Tuberculous subjects and the families of tuberculous subjects, who can afford to pay for the knowledge and training which positively and actually obviates all danger from the stricken individual, are quite willing to pay for it and will return in appreciation and esteem even much more than they can afford to give in money. To be able to make a consumptive feel that he is not endangering the lives of those who are near and dear to him, and to be able to make those who are near and dear to the consumptive feel absolutely secure against danger of infection in their intimate relations with him, is a power, the value of which, when exercised, cannot be represented in dollars and cents. This power should be in the hands of every physician, but it is not, because of the slowness with which truth and advanced knowledge filter through our medical schools and our medical journals into the rank and file of the profession.

To make a consumptive non-contagious is simple enough to the man who fully understands the subject and who is willing intelligently to direct his patient. Inasmuch as the contagium of tuberculosis is restricted to the broken-down tissue which is given off, and, perhaps in some degree to the excreta, and, inasmuch as these are gross objects which can be easily seen, handled, and controlled, all that is necessary is to devitalize them when they are given off without contaminating the individual who gives them off or the environment in which he lives, or at least to dispose of them in such a way that they cannot contaminate anything and cannot be brought back by any force in nature to a person who might become infected. The only excreta which are at all likely to contain tubercle bacilli are urine and feces, and these are ordinarily deposited where the fermentation that is going on will sterilize them before they can be brought back either to human beings or animals. Practically, there is probably no danger whatever of new implantations in either human beings or animals from these sources. The chief seed supply for new implantations of tuberculosis, undoubtedly, is the sputum given off by people who have tuberculosis of the lungs, and it is this which needs to be looked after above all others.

The correct method of disposing of sputum is to deposit it in a paper sputum cup which can be held close to the mouth, and then burn it. Supplementary to depositing the sputum in a cup, it is necessary that the consumptive hold a paper napkin before his mouth when he coughs and sneezes, that he carefully wipe his lips with a paper napkin every time he expectorates, that he use a paper napkin only once and then fold it up carefully, that he deposit all the paper napkins which he has used in a paper bag which he carries with him for that purpose, and

that he burn these when he has an accumulation of them. The physician should instruct every spitting patient how to do these things and should show him the materials which he should use and tell him in detail why every part of this procedure is absolutely necessary. Unless he does this and does it intelligently, his patient will not carry out the necessary practices or will carry them out only in part, and will thereby defeat his purposes and simply blind himself and his physician in the belief that he is non-contagious when he actually is contagious. The patient who uses the sputum cup at times and spits into a basin or a toilet at other times, and who uses a sputum cup at home and spits on the street when he is abroad may believe himself to be a cleanly person and to be harmless to himself and others, but in reality he is uncleanly and is dangerous both to himself and to others. A moment's thought will convince anyone who has had the opportunity of making observations on the spitting habit, that spitting away from the body sprays some sputum on the clothing of the person who spits and that no care in spitting can obviate this accident. The amount of sputum which is sprayed off in one expectoration, of course, is very little, but the amount which would accumulate upon the individual's clothing, in days and weeks, is considerable, and in a fairly advanced consumptive, is enough to contaminate the clothing in such a way as to make it give off dry tuberculous matter in the form of fine powder, every time it is agitated sufficiently. Spitting into cloths, or into paper napkins, is a very reprehensible practice because it is almost certain to contaminate the lips and hands of the spitter, and it is quite certain to contaminate his pockets and his clothing. Nothing, except the use of a sputum box, which can be held close to the mouth, should ever be tolerated by the physician. There are different kinds of paper sputum boxes available, anyone of which can easily be carried in the pocket. Physicians should see to it that a full supply of these sputum boxes and of paper napkins and paper bags be kept in every drug-store and be made available to every person who needs them.

When the consumptive becomes advanced in the disease so that he has to be confined to his bed, the problem of making him non-contagious becomes a little more difficult, but is still within the grasp of the resourceful physician. At this stage, the aid of a nurse or of some properly trained person is necessary, because the consumptive himself has no longer the physical and mental strength to co-operate efficiently in preventive practices. Through weakness and through forgetfulness, he soils his body linens and his bed linens with sputum, he soils his hands and his lips with it, and he spills it on the floor and on the furniture. Somebody must immediately sterilize the linens, cleanse the hands, lips, and face of the consumptive, and wipe up the floor and furniture when these contaminations take place. Among the very poor, this can only be done in a hospital, because the expense of doing it outside is too great to permit of it. The very poor should therefore always be removed to a hospital

and physicians should help break down the prejudice which now exists in our general hospitals against the admission of consumptives. There is no good reason at the present day for excluding a consumptive from a general hospital, because, with our present knowledge, a consumptive may be treated in a general hospital without the slightest danger to anyone else. To exclude him is a confession of ignorance and incompetence. Among the fairly well-to-do, the physician can easily train a member of the family to take care of the consumptive and to do those things which the patient himself can no longer do for the proper disposal of sputum. This training, however, should be thorough and should be followed up by supervision so that it may always be effective. The physician must not be content with merely telling the attendant what to do, but should show her how to do it and should continually watch whether she does it right.

There is a side to these preventive practices which is usually overlooked and which mean a great deal both to the physician and the patient. It is the part which accurate and definite prevention plays in the cure of the stricken individual. Tuberculosis has very little self-limiting capacity. It does gradually set up an immunity in the individual, but usually that immunity comes when it is too late, when, indeed, so much destruction of tissue has already taken place that the organism no longer possesses the necessary machinery for its own preservation. There is, however, a very great tendency to recovery in tuberculosis, and every tubercle which breaks down and comes away marks a step towards recovery and registers so much consumed energy by the organism for its self-preservation.

It is quite probable that re-implantation of the individual by the bacilli which have already been cast out is the chief seed supply for new growths. The tuberculous subject, therefore, who contaminates his hands and lips, his clothing and his environment, is constantly taking back bacilli which his organism has once rejected, and is thereby continuously throwing additional burdens upon his organism. That he sometimes gets well, in spite of this, is indeed marvelous, but usually he does not get well under such practices. Long observation of tuberculous cases has convinced me that with complete avoidance of re-implantation with bacilli given off by the consumptive himself, on account of the great tendency to recovery, most persons would get well with this measure alone were it practised from the very beginning. Making the tuberculous subject absolutely non-contagious is indeed the one best remedy in the treatment of tuberculosis for its cure.

In the curative treatment of tuberculosis, the physician at the present time can accomplish a great deal provided he is familiar with all the resources at the command of the profession, studies his case carefully in every detail and devotes himself enthusiastically to his work. Until recently, tuberculosis usually was looked upon as an incurable

disease, and many physicians still look upon it as such, or at least, are quite skeptical as to whether anything can really be done to bring about recovery. They still hold the old idea that change of climate may accomplish something; and, that while, perhaps, milk and eggs may do something, nothing can be accomplished worth while by medication or regime. Nowadays, most physicians do prescribe the milk and egg treatment and the fresh air treatment in a very general sort of a way, but beyond this they have very little to offer. During the last year or two, a great many men have also taken up the tuberculin treatment, but this, too, in an uncertain manner. All of these things are indications, however, that the profession as a body is awakening to the fact that tuberculosis is a disease which can be treated scientifically, with fair prospects of accomplishing desirable results.

There is, perhaps, no disease in the entire category of diseases more difficult to treat than tuberculosis and more yielding to treatment in the hands of a competent man. Every case has peculiarities of its own and must be treated in its own way, even though the general principles of treatment may be the same. In every case, moreover, conditions are liable to change from time to time, demanding a change in the treatment, and the physician must be on the alert to discover such changes as soon as they occur, as failure to discover them may jeopardize the chances of the patient for recovery. Changes of this kind do not often occur suddenly, but come on insiduously and clandestinely in such a way that they take one off his guard. A pleurisy may set in, for example, an effusion may take place, a nephritis may develop, or a localized pneumonia may grow out of an ordinary cold,—anyone of which, unless quickly recognized and corrected, is apt to lead to serious consequences. The stomach and the intestinal tract of the patient need constantly to be watched, because they may at any time be subject to functional disturbances of one kind or another.

In order to treat a case of tuberculosis skilfully, it is necessary that the physician first make himself familiar with the temperament, constitution, and the physical condition of his patient, and with his personal and family history. As far as possible, he should know all the weak points and all the strong points of his patient and he should completely understand his physiology so that he may be able to correct promptly every deviation of a function of the body from its normal physiological condition. He must know the weak points in the temperament and character of the patient in order that he may bolster them up. The treatment of tuberculosis is a long one and requires an optimistic turn of mind, a hopeful temperament, and a grim determination to do whatever is necessary, however difficult, for success. The physician must be able to keep his patient at doing hard things, not for a day or a week, but continuously and without intermission for months and sometimes for years. Even a temporary intermission of the regime which is necessary may prove to be the cause of failure in the end.

There is no specific remedy in tuberculosis, but there are many remedies which can be made to serve a useful purpose in cases to which they are adapted. Neither is there a specific plan of treatment, but there are many plans which may be successful in the hands of men who fully understand them and who are skilful at applying them. Everything depends upon the care and intelligence with which remedies and methods are used. Above all things, the treatment of tuberculosis should never become routine, except in the general plan, and this should be adhered to steadfastly, unless there is a good reason for changing it. Frequent and spasmodic change of plan of treatment never leads anywhere except to failure.

A few general principles can safely be laid down for the treatment of tuberculosis and these may be followed out in practically every case. First, the diet should be carefully fitted to the capacity of the individual to digest and assimilate it. In amount, it should not exceed what is necessary for the demands of the organism for fighting the disease and for storing away a little surplus. The food which will give the largest return with the least labor should be selected, but care should be taken that in the selection of this food, no idiosyncrasy of the individual be permitted to defeat the object sought after. For most people, milk and eggs with one meal of solid food a day, give the basis of a correct diet for a tuberculous subject, but occasionally, one meets an individual with idiosyncrasies which militate against such a basis of diet. The much used term of "forced feeding," must never be construed to mean stuffing, but should be interpreted to mean that the patient takes the selected diet against his inclinations if necessary and under the force of his own will, rather than through craving for the food. Misinterpretation of the meaning of forced feeding has lead to much mischief in the treatment of tuberculosis and has been responsible for a great many failures.

The second principle is that drugs may be used advantageously for putting a function of the organism into a physiological condition, or for aiding an organ of the body which is crippled in its functions, but should never be used for any other purpose. To give drugs because somebody else has used them, without understanding what they may accomplish or how they may accomplish it is bad practice. It is better to give no remedies at all than to use remedies which one does not fully understand.

Third.—Climate has no specific value in the treatment of tuberculosis. Change of scene and environment may be of use in cases in which the mental attitude is bad, but only in so far as it corrects the mental attitude. The best place in which to treat a case of tuberculosis is that in which the individual to be treated can get the greatest amount of happiness, the best food, the best hygienic conditions and most comforts of life for the smallest amount of money and with the least worry. For most

people, this is in the home or at least within easy distance of relatives and friends.

Fourth.—People of weak character, people living under bad domestic conditions which cannot be corrected, and people who cannot command the attention and service necessary for their treatment at home should be moved into a sanatorium. Perfect discipline and strict compliance with the rules laid down by the physician are essential for success in the treatment of tuberculosis, and where the individual is so weak in character that he will not carry out the treatment, in both spirit and letter, success cannot be attained except through the influence of others who understand something of the treatment. This influence can only be obtained in a sanatorium. To try to do the best one can with a patient under bad sanitary conditions and without proper supervision and attendance is foolish, because it always ends in failure.

Fifth.—Restoration to physical health is not synonymous with cure in tuberculosis and treatment of the disease cannot be safely stopped when physical health has been recovered. A disregard of this principle leads to more failures in the treatment of tuberculosis than any one thing. So long as the patient looks ill and feels ill, it is relatively easy to secure his co-operation and the co-operation of his friends, but when he begins to feel well and to look well to his relatives and friends, co-operation often ceases, and the patient takes himself into his own hands or places himself under the direction of his family. It takes years to recover from tuberculosis, under the most favorable conditions, and the physician who commits himself to the idea that a tuberculous patient has recovered in a few months because he has regained the appearances of health is apt to experience an humiliation later on, if he lives long enough, in seeing his patient transferred to an undertaker. No case, however well, should ever be reported as cured. It is much safer to use the term "disease arrested," and to look upon every case as liable to a recrudescence of the disease.

Sixth.—Whilst rest and exercise are both useful in the treatment of tuberculosis when properly used, rest should always be used where there is doubt, because it can do no harm and exercise can. In the acute stage of tuberculosis, absolute rest should be insisted upon, and it should be maintained until all acute symptoms have passed off, even if it takes a year for this to occur. In fact, time cannot be considered in the treatment of tuberculosis. However long it may take to bring about recovery, one must be reconciled, because haste is almost certain to lead to fatal errors. Impatience to get about and to be doing something is frequently the cause of prolongation of the disease, because every time the patient gets into a fair condition he becomes active and has a relapse, going back to a little worse condition than he started from the time before. To recover from such a relapse takes months and valuable time is frittered away without any real progress being made. The physician

must be firm in his insistence on absolute rest until he is fully convinced that exercise may be taken with safety and profit. When exercise is begun, it should be under the supervision and control of the physician.

Seventh.—Stimulants, depressants and opiates should be avoided, unless there is a very specific, peremptory reason for using them. When used, they should be prescribed in the smallest quantities possible and never left to the discretion of the patient or the judgment of a nurse. Alcohol may be used advantageously in certain complications of tuberculosis, but in the hands of most men, it is more likely to do harm than to do good. Tobacco should not be used except, perhaps, after dinner and then only by patients who are in good physical condition and who have a strong, vigorous heart action. The more skilful the physician becomes in the treatment of tuberculosis, the less opium will he use. The experienced and competent physician can get along without the drug, except perhaps, in a few cases during the last few days of life, especially when there is a laryngeal complication.

Eighth.—Fresh air is essential to the correct treatment of tuberculosis. This does not mean that the patient must be frozen to death in winter, but merely that there must be avoidance of re-breathing the same air twice. The ideal life is in the open air, because then it is physicially impossible for any of the air which has been exhaled to come back to the patient. Satisfactory conditions for a proper change of air can, however, be produced in a room even with a comfortable temperature by having the windows open on two sides of the room. In winter, heat in a room aids ventilation and is of benefit. Unfortunately, it is very expensive to heat a room with the windows open and most people must content themselves with a cold ventilated room for sleeping purposes, at least, if they are to have ventilation at all. An economical way is to have the patient sleep in a room without heat, and eat and dress in a room which is heated and fairly well ventilated. Drafts need not be regarded in arranging for the ventilation of a room, as they can do no harm when the patient is properly clad and properly covered while in bed and are really essential to a proper change of air. It is by movement that the air cleanses itself of its impurities, and it is only when the air in the room moves rapidly and the warm, polluted, expired air gets away from the patient quickly that the patient avoids re-breathing the air which he has exhaled.

Ninth.—Tuberculin, bacterin and sera have a value in the treatment of tuberculosis, but should always be used cautiously, and unless well understood had better not be used at all. Tuberculins need to be used with greater caution than bacterins and sera, because their abuse is fraught with greater danger. One must always keep in mind when using these substances that the injury that may come from their improper use may be very far-reaching and irreparable, and that in the long run it may be safer to go on without using them. All of them should be started in

small dosages and unless the physician feels secure in his position should be continued in small dosages. It is not practicable to guide their use by the Opsonic Index and the physician must, therefore, learn to use them in an empirical way. A very safe and useful way of getting serum treatment for a patient is by putting on fly-blisters and absorbing the serum from the blister. This gives the patient his own serum and is followed by excellent results.

Tenth.—Excretory functions of the patient should be kept active in order that the poisons generated by the micro-organisms which are infesting him may be kept out of the system, and also in order that the debris and used-up substances which probably give a good pabulum for the growth of micro-organisms may be kept as low in the organism as possible. It is quite probable that most of the disease-producing organisms grow on the dead tissue in our bodies rather than on the living tissue, and that just in proportion as we have dead tissue and used-up material circulating in our blood and in the juices of our bodies, micro-organisms find good soil for their growth. The skin which is the largest eliminatory organ of the body should be kept clean and active, and for this reason should receive daily ablutions and frequent scrubs with soap and hot water. The bowels should be kept flushed out preferably with Epsom salts. The kidneys are usually well flushed out by the liquid diet. Nothing should be used for aperient purposes which can in any way congest or irritate the intra-abdominal organs. Next to Epsom salts, castor oil is the best drug at our command for cleaning out the bowels in tuberculosis.

In the matter of alleviating pain and disquietude of every kind, the physician should resort more to mental influence than to drugs. With most people a little reassurance is all that is necessary. There are a great many fugitive pains in tuberculosis which grow with dwelling upon them, and which can be relieved promptly by an assurance from the physician that they have no evil import. Pain which is due to an inflammatory condition, such as occurs in pleurisy, can best be relieved by putting the part at rest. Cough and nervousness can usually be controlled by rest and by the will power of the patient when properly brought into play. Frequently, the remedy which is needed for all of these complaints dependent upon the nervous system is absolute rest in bed, and when it is needed, it should be resorted to without hesitation and without compromise.

Finally, the physician must know how much tuberculosis his patient has, and what the complications are. Tuberculosis begins first as an uncomplicated disease, but rarely comes to the attention of the physician as such. Usually, the patient consults the physician when the first serious complication has set in and consults him for the complication, rather than for the tuberculous process itself. The complications which most frequently bring the tuberculous subject to the physician are colds, grippe, pneumonia, pleurisy, hemorrhage, inanition and various forms of gastric

disturbances. Most of these complications, at least those of an acute form, are self-limiting, provided the patient is put at rest and his organism is given a chance to recover itself. They are misleading, however, when first encountered and may give the physician a very erroneous idea of the amount of tuberculous process which is going on. One should be very careful, therefore, about giving on opinion as to the tuberculous involvement when he first sees a case in an acute condition. On the other hand, one must also be on his guard against being misled in the other direction into an idea that there is not much tuberculosis in the case when the acute conditions have passed off. Every case should be carefully studied physically and should be charted with an analysis of all the pathological conditions and functional disturbances, so that as far as possible, a clear-cut idea may be formed of how much tuberculous process there really is. The prognosis of a case and the plan of treatment hinge largely upon the amount of tuberculous involvement. Patient, persevering effort in studying a case will enable any physician of fair training to reach satisfactory conclusions in these matters, and when he cannot reach them, he should, by all means, call for assistance before he goes on with the treatment of his case. Nothing is more foolish than for a physician to try to treat a case blindly, for when he does it, he invariably fails in obtaining results and ends in confusion. It will no longer do for the physician to ease his conscience by saying to himself that he is doing as much for his patient as anyone else could do, and that he is, after all, dealing with a disease in which favorable results are unattainable. As good, if not better, results can nowadays be obtained in the treatment of tuberculosis as in any disease with which the medical profession has to deal, and when the physician does not obtain good results, it is because he does not possess the knowledge and skill necessary for obtaining such results. Often, it is not so much the want of knowledge and skill as the want of honest application of them. It takes time to study a case of tuberculosis well enough to be able to treat it well and it requires painstaking work. The physician must recognize this and he must also recognize that the time and pains which are necessary can only be given for a commensurate fee and he must have the courage to charge the fee which is necessary to be able to do the work. He need not see his patient often, usually not more often than once in two weeks, and sometimes not more often than once in a month, but when he does see him, he must study him carefully, and give him the best that he has. If he has made his first study of the case thoroughly and has kept the proper record of it, the time and labor required for subsequent visits are much less, but, at every visit, he should go over his case thoroughly enough to be able to determine definitely whether any complilcations have occurred, or any new developments have taken place in the interim between the visits. With this kind of treatment and supervision, the physician who is willing to give it will find in tuberculosis a remunerative and satisfying field of labor.

A FREQUENT ETIOLOGICAL FACTOR COMMON TO FACIAL MALFORMATION AND ACUTE INFECTIOUS DISEASES.

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The need of a paper along some such line as the following, was suggested by some of the Medical School Inspectors here in Chicago as well as by the Medical Superintendent of the Talulip Indian Agency, Washington.

These men, in the daily discharge of their duties, feel that the training they have received in the Medical Schools upon dental subjects was too meagre, and that a broader knowledge of some of the more common dental subjects would assist them in the discharge of their duties as well as better serve the patients themselves.

A study of the normal mouth of a five-year-old child shows twenty teeth, five on either side of the median line above and below, the upper anterior teeth overlapping the lower teeth and the cusps of the upper interlocking with the lower molars in occlusion.

In order that the general practitioner or family physician may be better able to cope with conditions of the child in later life, conditions which are now being recognized as of vital importance, it is necessary that he be conversant with more of the problems of dentistry as they pertain to the health of the individual. As yet, although Boards of Health recognize the importance of healthy teeth and their bearing upon the individual and civic health, there is very little along this line taught in the medical schools. It is not intended that the Medical School Inspector cover the ground expected of a Dental School Inspector, but the problems of health and disease having such an important bearing upon the conditions found in the mouth, it is necessary that the physician should be able to recognize these conditions in their incipiency and recommend proper treatment. It is important that the physician make a diagnosis of conditions found in the mouth and have some idea of what will happen if the case in hand is allowed to go on unattended. It is the physician, and not the dentist, who first sees the child, and if he through carelessness or ignorance does not recommend the needed dental services, the child too often is allowed to suffer irreparably before receiving such services.

Many of the so-called cryptogenic infections may be traced to cavities in the teeth. These same cavities harbor the germs of infectious

diseases long after the child has recovered from them; and just as a typhoid patient, whose gall-bladder harboring the typhoid bacillus, is a menace to the community, so is the patient who has had diphtheria a source of infection long after the bacilli have disappeared from the throat and other mucous membranes. These germs are not affected by antitoxin because they lie secluded within cavities whose walls are not bathed in blood-serum carrying the therapeutic agent.

The importance of the first permanent molar cannot be overestimated, as it has a multiple bearing upon the health of the individual. Therefore, it should be recognized by the parents and family physician as soon as it makes its appearance above the gum. At the age of about six years, this tooth appears behind the temporary teeth, and as the child has as yet lost none of the temporary teeth, it is often mistaken for a temporary tooth also. It can be easily recognized, as it is the sixth tooth from the median line. The upper first permanent molar is the largest tooth in the mouth, the lower one, the second largest. In shape the lower one is trapezoidal, having five cusps, five grooves (the buccal groove extending over the buccal surface often ends in a pit), and a central fossa.

The upper first permanent molar is rhombic in form, having four cusps, four grooves and two principal fossæ. The cusps correspond to the developmental lobes and points of beginning calcification, while the grooves mark the lines of coalescence between the lobes. Why these strong, well-defined cusps and deep fossæ?

It must be emphasized that these cusps of the four permanent teeth taken together, fitting into their respective fossæ, are the key to character as shown in the face. Should these cusps not properly interlock during occlusion, a weak, small receding chin, excessive prognathism, or a "scissor-bite" results, depending upon whether the bite is posterior, anterior or lateral to its normal position. These four teeth maintain the proper relation of the jaws to each other while the rest of the permanent teeth are in the process of eruption. They also act as the foundation against which the forces of facial development are directed. If the foundation is faulty or not stable, proper facial development does not take place. The lines, planes, and angles of the cusps and positions of the teeth in the jaws are so designed, that the force of mastication together with the inherent force of growth, carries the jaws forward and outward and, together with them, the bones of the face and nose. This is not a movement *en masse* but an actual growth. The pressure exerted by these teeth in their growth causes a continual resorption of existing bone which is as constantly rebuilt, the result being an actual growth.

A careful study of a normal set of teeth in occlusion, their position in the arches, and of the individual teeth, shows what we are pleased to call the result of the inherent forces of nature. We can see that nature has not disregarded any of the laws of physics but, on the contrary, has very wisely made use of them.

Irregularities of the teeth invite decay and disease of the gums with all their dire results, and loss of the first permanent molar is a prolific source of irregularities. Why does the first permanent molar decay so early in life? It erupts at a period in life before immunity may be said to supervene. We know that we do have periods of immunity from decay. Lack of care of the teeth at this age is another cause. Irregular eating of improper foods and sweets, together with intestinal disorders so common to childhood, are accompanied by abnormal conditions of the oral mucous membranes inviting fermentation. Calcification of this tooth occurs at a time when the child is prone to have various diseases of childhood, in consequence of which metabolism is interfered with and faulty calcification occurs (the counterpart of Hutchinson teeth, which are not syphilitic except that syphilis may at this time so disturb metabolism that faulty calcification results).

The lines of coalescence between the lobes are often faulty and fissures in the enamel result. Possibly the agents which cause hare-lip, cleft-palate and similar conditions, play a part in tooth formation as well; at any rate, the faulty formation harbors the bacteria of decay and they begin their work of dissolution of lime salts. Decay having begun, why is it neglected? For the reason that lack of knowledge on the part of parents, due to the fact that their attention is not usually called to the trouble until it gives pain and much tooth substance has been destroyed, is the real obstacle. They, not knowing that the child has erupted a permanent tooth, believe the offending member a temporary one that will soon be lost; hence, they think it of no consequence. The family physician, who has probably been called a number of times to treat some slight illness, has not noticed the decayed tooth, and has not pointed out to the parents that the child needs the services of a dentist, in order that one of the most valuable teeth of the mouth may not be lost.

Lack of Care of the First Permanent Molar and Consequences.—As these molar teeth at this time bear the brunt of the stress in mastication, the loss of the tooth itself as a valuable member in mastication is a serious matter. Again, if the tooth is lost, the foundation, upon which rests the centre of resistance necessary to the development of that side of the jaw or face, is lost, and a contracted arch, irregular teeth and asymmetry of the face result. Now that the natural forces of nature are diverted, they act just as strongly as though they were being exercised in a normal manner, and, in consequence, there is an ever-increasing deformity.

Upon eruption of the second permanent molar, a new difficulty arises —namely, the second molar being unsupported mesially, is tipped over forward and partially fills in the space left by the missing member. The development of the third molar is largely responsible for this and instead of a proper occlusion, the grinding surface of the tooth is directed forward, this change of position inviting decay between the second and third molars and disease of the adjacent soft parts.

Lack of development of the bones of the face is synonymous with inadequate and malformed nasal passages, with consequent adenoids, frontal, or ethmoidal disease. It is necessary that the child use all the teeth and the more normal stress regularly brought upon them the better, as it furthers development of the face and jaws.

The face, as an index of character, is not entirely predestined, but by carelessly allowing lack of normal development to occur, which will occur if, by extraction or loss of teeth, the normal development of the lower jaw and chin is prevented, the child's face is stamped as one who has lack of determination, weak will power, etc., and because of his appearance he is taught and treated as though this were the case. Finally, he himself believes it and really becomes so. On the other hand, had appearances not been deceptive and by caring for his teeth it had been granted him to develop normally, his face would have borne no such stigma and in reality he would have had a stronger character.

Caries of the enamel progresses slowly, beginning frequently in the faulty fissures of the crowns where the organisms find lodgment, but once through the enamel, the process goes on rapidly, undermining the enamel which to the unpractised eye shows very little change, until finally a large portion of the enamel breaks down, revealing a large cavity whose walls are of decalcified dentine, the removal of which exposes the pulp. This may have gone on painlessly, but now the pressure of food during mastication causes pain and the child avoids chewing upon that tooth; and if similar cavities exist on either side of the mouth, the food is not masticated and the foundation for gsatro-intestinal disorders is laid. Not only this, but the plan of development is thwarted. Nature has so placed the teeth in the arches, that their use stimulates normal development and growth, and if these forces are not utilized, normal development does not take place. The proper use of the teeth is also designed by nature to act as a cleansing agent in that the forms of the teeth and inter-dental gum-septæ govern the excursion of food over their surfaces, thereby keeping them clean. Cavities and pockets between the teeth harbor not only pathogenic organisms, such as cause diphtheria, scarlet fever, pneumonia, etc., but saprophytic organisms as well, and it does not require a vivid imagination to grasp the dangers which accompany the "swapping of gum," biting of each others' apples, etc., as children are prone to do. Not only is disease spread in this manner, but the process of germ proliferation, especially of the saprophytes within carious cavities, is a menace to the health of the child within whose mouth this action takes place.

The constant absorption by the mucous membranes of the mouth and throat, as well as swallowing the ptomains, or if you please, leukomains, is without doubt, the cause of much malnutrition with its consequent lack of resistance. It seems probable that cervical adenopathy, as well as tonsillar disease, may have its origin in carious tooth cavities.

At least, the process may be prolonged or repeatedly reimplanted from these dêpots.

The etiology of pernicious anemia has been pointed out as being related to just such cavities. We know that the germs of the infective granulomata are found within carious tooth cavities, the tubercle bacillus in great frequency. From these cavities, the organisms pass either by continuity of gum-tissue, or through the pulp chambers and root canals, into the deeper tissues and there set up their growths.

Alveolar abscess, to the general practitioner, is rather a vague term, but as a matter of fact it is but an osteomyelitis and should receive the treatment given that process in other parts of the body. Alveolar abscess very rarely occurs unless the pulp of a tooth has died. The organisms follow in the wake of a carious process, and when the pulp chamber is exposed, the necrotic pulp forms a pabulum for the germs. They finally pass out through the apical foramina and set up their activity anew. The process may be acute or chronic, usually acute becoming chronic, and it is these chronic abscesses extending with acute exacerbations over a period of years, that give rise to infections in other parts of the body, particularly in the larger joints, with resultant partial or complete ankylosis.

Prof. G. V. Black has found that there are less than twenty microorganisms, most of them non-pathogenic, which may be said to be indigenous to the human mouth; myriads of others flourish for a time, then die out only to be reinstated at some future time. It seems quite rational to suppose that if the mouth be kept in a better sanitary condition, there would be less tonsillar disease.

Somewhat contrary to the belief of many, it seems that if the proper use of the tooth-brush be supplemented by an efficient antiseptic mouthwash, much bacterial life could be destroyed. I should recommend a mouthwash containing oil of cassia or cinnamon, which is pleasant and most efficient, notwithstanding the fact that the synthetic oil, which is about one-half as efficient as the natural product, has supplanted it.

Aside from the philanthropic side of the question, and from a cold monetary view of the subject, it is cheaper for the individual, who is taxed to support the criminal and charitable institutions, and for the State, which must support them for the protection of society, to limit the number of criminals and delinquents rather than care for them afterward. To this end, the limitation must begin with school-children. Children who are delinquent in their studies are so because of some active cause which may be one of many. Poor health is the one broad term which expresses the sum total, comprising poor hygiene at home and at school. How much more active are these causes upon the organism which, on account of physical deformity of teeth, mouth, face and nose, must breathe through its mouth, furthering the development of adenoids and of hypertrophic tonsils that results in listlessness, lack of am-

bition, and a dulled mentality. On account of the inability of children to keep up with their classes, they are often neglected, even chastised by their teachers; and here begins a rebellion which increases in its scope and development, until the child attains its majority and acts in open defiance of all law and order. Should the causes be active enough seriously to arrest both mental and physical development, the individual finally lands in an almshouse, where he must be maintained by the State, and that means taxation of the individual citizen. Would it not be better to care for the growing child and assist for a time during his formative period, so that ultimately, through his own efforts, he would be a valuable citizen of the commonwealth, than to allow him to grow up and become a ward of the State, which means a ward of society at large?

RÉSUMÉ.

(1) The first permanent molars erupting at about six years, are the most important teeth in the mouth.

(2) They appear before any of the deciduous teeth have been lost.

(3) The loss of one or more of them invariably leads to faulty development of the dental arch, faulty development of the bones of the face and nose or both.

(4) Decay should not be allowed to persist in the mouth because by it the teeth are lost and cavities harbor pathogenic organisms, endangering not only the patient himself but those with whom he comes in contact.

(5) Cavities in teeth also harbor the putrefactive organisms which produce ptomains.

(6) Much of what has been said regarding the first permanent molar applies to the other teeth, both temporary and permanent as well.

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UTERINE HEMORRHAGE: ITS RELATION TO UTERINE CANCER.

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In the performance of my duties at the St. Louis Skin and Cancer Hospital, during the past four years, I have given special attention, in the taking of histories, to the relation which hemorrhage bears to the other early symptoms noted by the patient. When one considers how extensive has been the propaganda of education concerning uterine cancer, in the past ten years, it would certainly seem that the profession must be alive to the importance of hemorrhage as a symptom of the most urgent significance. This makes it all the more disheartening to meet patient after patient, giving what has become almost a classic type of history—which, in retrospect, might well be termed a history of neglect. We hear much of the need of education of the laity concerning this subject, and the St. Louis Skin and Cancer Hospital has tried various measures to effect such education, but when it is so very common for patients to say that their physician has made no local examination; or, having made an examination, has advised douches and given comforting advice; or, perhaps, has given local treatment for "ulcerated womb," extending over weeks and months of the most important time in the patient's life—when, day by day, we note such things, it certainly seems that the profession needs education. We have of course been careful not to add to the misery of the patient by intimating that there has been any seeming neglect, even in the most palpable cases, but there can be no doubt that the profession must bear much of the blame in cases of inoperable uterine cancer; for, as in breast cancer, the disease rarely advances rapidly without manifesting its presence by the appearance of some abnormal sign or symptom. I believe we diagnose tuberculosis in its early stages because the patient demands an explanation of the cause of any chest symptoms, and, in like manner, if the woman with abnormal blood-showings demanded a positive denial of the existence of cancer, I believe we would be more careful.

But while it is easy to censure the medical attendant for negligence in failing to avail himself of the common methods of making a proper diagnosis, it must be admitted that at times the cause of abnormal hemorrhage is very difficult to ascertain, and, as will be seen when we consider blood-losses at the menopause, we are often forced to admit that no sufficient cause can be assigned. But while we recognize the facts

that many women do not menstruate regularly, that the menopause is not established in a uniform manner, and that the menstrual flow often recurs from time to time, during the two years subsequent to the date of cessation of the regular flow, the point I wish to emphasize is that the knowledge of such facts must not deter us from a careful study of each case, keeping well in mind the constant fear of error in our explanation; and it can be only after we have submitted the product of repeated curettings to a careful pathologist that we may be permitted to deduce the cause of "idiopathic hemorrhages" from sound reasoning, as Kubo suggests.

The symptom of the greatest importance in the early recognition of uterine cancer is abnormal hemorrhage. Our records show that, of all the cases occurring during menstrual life, only one gave a history of normal menstruation, and absence of intermenstrual blood-loss. She complained of pain in the lower abdomen, and was the only patient who presented such an anomaly. Of the remaining cases occurring during menstrual life 56 per cent. gave a history of intermenstrual blood-losses, while 44 per cent. gave a history of increased menstrual flow.

Of the cases which developed after the menopause 67 per cent. complained of hemorrhage as the first symptom; 23 per cent. first noticed a discharge without bleeding, while but 10 per cent. complained of pain attended by discharge of "leucorrheal" nature as the first symptom. By blood-losses we mean all discharges of this nature, from the occasional drop after intercourse, or coughing, on lifting, to the sudden, unprovoked "gushes." This point should not be forgotten in questioning our patients, for they usually remember only the large losses of blood.

It is not the object of this paper to consider all the causes of unusual uterine hemorrhage, nor to discuss the constitutional conditions attended by metrorrhagia, but briefly to cite the more important local lesions, which might obscure the diagnosis of malignancy. We will then consider hemorrhage occurring abnormally; first, during the pregnant state; second, during menstrual life without pregnancy; and third, after the menopause.

In hemorrhage appearing during pregnancy we think of (a) abortion, (b) premature separation of the placenta, (c) placenta previa, or (d) ectopic gestation. The history and examination required for the diagnosis of either of these conditions should preclude the possibility of failure to recognize a concurrent malignant involvement of the uterus. It is only when we bear well in mind that cancer may occur independently of any condition of the uterus or adnexa that mistakes in diagnosis will be avoided. Even slight discharges of blood during normal pregnancy may be deceptive, as in case No. 522: Patient, aged 33, gave a history of occasional hemorrhage of slight degree, occurring after coition during the latter half of pregnancy. Though she consulted physicians for this disturbance she was not examined, nor was she examined after delivery. She again consulted different physicians at four and six months after

delivery, when she said the bloody discharges were quite free, yet no examination was made. One and a half years after delivery she appeared at the clinic with an inoperable cancer, involving the cervix and vaginal vault.

Despite the well-known fact that cancer frequently causes abortion, we have received several cases of advanced cervical carcinoma, which gave a history of abortion, followed by small hemorrhages, treated by douches without an examination having been made. These facts are certainly deplorable.

Hemorrhages during menstrual life without pregnancy.—Under this heading we have a great variety of conditions which may cause us to overlook the diagnosis of incipient or early cancer. Common among these are (a) endocervicitis, (b) cervical lacerations, (c) cervical chancre, (d) endometritis, (e) tubal neoplasms, (f) salpingitis, (g) benign uterine growths, (h) chorio-epithelioma, (i) idiopathic menorrhagia and metrorrhagia. Less common are (j) blood cysts of the uterus and (k) tuberculosis of the cervix, neither of which I have observed. Huguin and Lebert (*Rev. de Gyn. and Chir.* Abs., 1907) describe two varities of blood cysts: (a) from obliteration or rupture of angiomata, and (b) from transformation of preëxisting cysts. In both there is hemorrhage and severe pelvic pain. Hysterectomy is alone of any benefit. Tuberculous ulcerations of the cervix are divided by Lannes-Dehore (*Thèse de Lyons.* Abs. *Zentralb. f. Gyn.* 1906, 34) into the miliary, ulcerating and proliferating varieties.

Referring now to the more common types of uterine lesions, as above noted, I believe there are four classes of cases deserving of marked attention. At least these four classes have been more common in my experience, and, from the histories of patients applying to the St. Louis Skin and Cancer Hospital, they have been productive of more errors in the practice of other physicians than have other lesions occurring during menstrual life. These classes are: (1) Endocervicitis, (2) chancre of cervix, (3) small benign growths, (4) deep cervical lacerations.

(1) In endocervicitis of the chronic type the infection produces eversion of the mucosa, with infiltraton of the tissues and nodosities due to the infected Nabothian glands. We commonly have also marked menstrual disturbances. (2) In cervical chancre, the slight erosion with the customary infiltration, before the occurrence of the rash, is quite suspicious of beginning malignancy. I have observed three chancres which developed on old lacerated cervices and all were accompanied by prolonged menstruation. All were in married women and only the prompt report from the pathologist's examination of a wedge of tissue, submitted to him for diagnosis, relieved the anxiety, for in one case the secondaries did not appear until eight weeks after the case first came under observation. (3) Small benign growths protruding from the os,

with inflammatory involvement of the parametrial tissues, or with irregular enlargement of the uterine body by small fibromata, also render an immediate diagnosis impossible, especially as the blood-losses cause a suspicious loss of flesh and strength.

(4) Deep cervical lacerations, with enlargement of the uterus and attendant menorrhagia, are very common and should be regarded with more fear than is customary. It is a reproach to the science of obstetrics that women are dismissed, after labor, with torn cervices, when intelligent care would restore them to a normal condition. It is now perfectly safe to examine the cervix on the seventh or eighth day after labor, and equally safe to repair any lacerations at that time. Since Hirst first spoke of this procedure the writer has pursued this course, without any infection or complication developing. No anesthesia is required for the slight scarification and the application of the ligatures require no handling of the parts even with the gloved hand. The intelligent use of retractors and the mobility of the cervix permit repair even in the presence of a recently restored perineum. There can be no doubt that this procedure contributes greatly to the immediate good health of the woman, and its universal adoption would perhaps cause a marked lessening in the number of cervical cancers, though we do assuredly meet with cases in women who have never been pregnant. But the grave danger, which at present confronts us, lies in the fact that all affections of the uterus, cervical and corporeal, improve under any form of treatment commonly applied where rest and local hygienic measures are adopted. For this reason, if our diagnosis has not been sufficiently searching, the patient may escape from observation until too late to be completely cured of any malignant condition. All women share the same fear of uterine cancer, and it is to be regretted that physicians in general do not have this fear. If all would honestly refuse to treat cases of uterine hemorrhage, which would not permit the removal of a piece of indurated cervix, or would not permit a curettage for examination of the specimen, there would be a great increase in the number of cured cases of uterine cancer. Our present hope lies entirely in the honest treatment of these cases, and thus is almost wholly in the hands of our profession. It will continue to be difficult to educate the laity, when they can readily find so many men willing to give them so-called "treatments" for abnormal uterine blood-losses, without having exhausted all the well-recognized diagnostic measures.

Concerning the larger benign growths little need be said, for their tendency to cause severe complications and to undergo necrotic and degenerative changes and to produce pressure-symptoms has caused them to be regarded with so much disfavor, that the profession has almost unanimously agreed to advocate their removal, as soon as the patient will consent.

Hemorrhages during and after the menopause.—Here we may properly consider the above-mentioned idiopathic menorrhagias and metror-

rhagias, and in them we meet with our greatest difficulties in diagnosis. These perplexities arise from the facts that malignant changes are more common at this period, and that we do not find uniformity in the establishment of the menopause. Good observers have declared that all hemorrhages after the menopause are due to malignancy, and, to the clinician of hospital cases, this seems a truism, but we all have recorded cases of women, who have recurrences of an apparently normal menstrual flow, appearing at intervals, during the two years following the gradual cessation of menstruation. Again we have cases of women, suffering an excessive loss of what is apparently menstrual blood, and, in both these classes, there are no malignant changes, and indeed often the most careful search reveals no gross local or constitutional lesion. It is not necessary, at this time, to discuss the various theories of the causation of this condition but, rather, to emphasize the fact that cases of true idiopathic menorrhagia, occurring at the time of the menopause, are comparatively unusual. We know that the laity still believe, as did the medical world, twenty years ago, that such manifestations are not worthy of much comment. Duff was probably the first of writers to combat this opinion, with the absolute proof of his statistics, when he showed that, of 482 women free from pelvic disease, 39, or 8 per cent only, gave a history of unusual blood-loss, while only five of these had a marked menorrhagia. On the whole it must be safe to assert that we find a great number of advanced cancers of the uterus, because the idea of the bloody menopause does not awaken fear in the minds of the laity and of the profession.

In conclusion:

1. Of all cases of uterine cancer, received at the St. Louis Skin and Cancer Hospital, occurring during menstrual life, only one gave no history of menorrhagia or metrorrhagia as the first symptom.

2. Of all cases occurring after the menopause, 67 per cent. gave a history of blood-loss, as the first symptom.

3. Any abnormal uterine blood-loss, occurring at any age, should demand as rigid an investigation for the discovery of a possible cancer, as any cough demands for the discovery of a possible tuberculosis.

SOME THOUGHTS ON ARTIFICIAL INFANT FEEDING, WITH SPECIAL REFERENCE TO THE DANGER OF DEFICIENT PROTEIDS.

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Ever since, by reason of the unfortunate decrease in maternal nursing, the ingenuity of physicians has been tried to discover a suitable substitute for the human breast in the nourishment of infants, the proteids, or casein, of cow's milk has been considered the element most difficult of digestion. As a consequence, the numerous methods and devices for the modification of cow's milk have had, as a rule, the alteration or attenuation of the casein as their chief aim. This has been the reason for the dilution with water, gruels or lime-water; predigestion; the addition of whey or cream; the removal of part of the casein by precipitation; and other methods too numerous to mention. In recent years, however, the indigestibility of the casein has been seriously questioned by many, and totally denied by others,—notably by Finkelstein, Czerny, Keller, and their followers,—who insist that it is the fat which is the offending element in cow's milk; while the casein is easy of digestion, and never causes disturbance or undergoes decomposition,—the foul-smelling stools, usually attributed to it, being due to putrefaction of mucous and intestinal secretions.

The idea that the casein was injurious arose from the presence, in the stools of infants taking cow's milk, of masses or curds, which were supposed to be undigested casein, but which, in reality, in the majority of cases, are composed of fat in the form of fatty acids and soaps. It is not my purpose, at this time, to discuss the nature of the curds in the infant's stool, or whether casein is injurious or not,—questions about which much warfare has been waged recently. Suffice it to say that there is little doubt that the majority of curds encountered in infants' stools are fatty in their nature; although casein curds do occur, but much less frequently than the former. The former are soft, yellow, and easily broken up; the latter, large, tough, light in color, bean-like in shape, and not readily disintegrated. The idea that the casein is the harmless element in cow's milk is quite at variance with the views hitherto prevalent in this country and elsewhere; and, although Finkelstein's contention has not been absolutely proven, there is considerable evidence to support his conception of the harmlessness of casein and the indigestibility of cow's-milk fat

by the infant. My own clinical experience has certainly taught me that most of the trouble experienced by infants in digesting cow's milk is due to its fat, and this is specially true in those over six months of age.

The conception that casein is indigestible led to the American system of percentage-feeding, so convenient and so useful in adapting the different elements of cow's milk to the various nutritive needs of the infant; and it is this conception, also, that has led, and continues to lead, many physicians to underfeed, and sometimes to overfeed, not only as regards the proteids, but also with the other elements of cow's milk. The great importance of proteid, or nitrogen, to growing infants must always be kept in mind in their artificial nourishment. This element repairs the waste consequent upon the wear and tear of the tissues and of the body substances, and is stored up to meet the demands of the rapidly growing organism; it also supplies heat and energy to the body, but only in slight degree in infants, this being effected by the carbohydrates (Meara). Infants fed upon mixtures in which the proteids are kept low, because of weak digestive powers, are apt to suffer materially. Such are usually under weight and anemic, with feeble circulation, weak digestion and flabby muscles, and exhibit other evidences of malnutrition. Rickets may develop from this cause; so, also, may scurvy, an affection closely allied to the former nutritional disorder; for I am convinced that it is not alone the lack of freshness in the food that is the cause of infantile scurvy; in sufficient food, particularly insufficient proteids, playing an important rôle. This is one of the reasons why condensed milk, so lacking in fat, and specially in proteids, is so potent in provoking this disorder.

As already stated, it is the idea of the indigestibility of the casein that has led to the practice, so often encountered, of keeping infants for long periods on low proteids, or feeding with proprietary foods deficient in this element, simply because of curds in the stools or of other signs of indigestion, but it is a dangerous procedure, and often leaves an impression upon the system that may handicap the individual for life. Many instances of infantile atrophy, malnutrition and difficult feeding have their origin, not so much in high proteids in the beginning, as in high fat. Of course, it is a wise and safe practice to begin with low proteids (.50 to .75 per cent.) to speak in percentages, *i. e.*, a dilution of from 1/7 to 1/5; but the fat should also be low, and should not in the earlier weeks exceed 1 or 1.5 per cent. Indeed, in many cases better results are obtained if the fat is about equal to the proteids, *e. g.*, in simple dilutions of whole milk. The proteids may then be slowly increased until they reach 2 per cent. at five or six months, and 3.50 per cent. at one year. The fat may also be gradually increased; but should never, in my opinion exceed 3 per cent. until the proteids reach 2.7 per cent. Signs of fat-indigestion (vomiting, soft curds in all the stools, obstinate constipation or diarrhea) at once call for a reduction in this element — often to a level with, or below, the proteids. Especially in summer is this imperative; indeed, many of the

fermental and dyspeptic diarrheas of this season may be promptly relieved, after a day or two of cereal gruels, by fat-free and fat-poor mixtures, *e. g.*, by feeding, first, with whey or skimmed milk; and then, with simple dilutions of whole milk, followed by a cautious increase of the fat up to or below the amount taken before the illness began. After the fifth or sixth month, high-proteid mixtures are better borne than in early infancy; but there is a corresponding difficulty in managing the fat—much more so than in the earlier months. Hence, at this age it is advisable and safe, specially in summer, to keep the fat on a level with, or but a little above, the proteids (with 2.50 per cent. proteids, 2.8 or 3 per cent. fat).

At this period, also, *and at all ages*, it is a great mistake to feed low proteids simply because curds appear in the stools. One occasionally sees infants of ten, twelve, or fourteen months taking 4 per cent. fat and from 1.50 to 2.50 per cent. proteids. (I speak in percentages, because of their convenience.) Such infants always present, in their nutrition, evidences, slight though they may be, of the evils of proteid-insufficiency, and relatively high fats. Illustrative of this point is the case of Baby B., thirteen months old, taking 4.25 per cent. fat and 2 per cent. proteids; sleeping and eating well; weight, eighteen pounds; but anemic, flabby, constipated, and subject to night sweats. Improvement in weight and general symptoms, specially the constipation, followed the increase of proteids to 3 per cent. and the reduction of fat to 3.33 per cent., succeeded by a rapid advance to whole milk. Similar to the foregoing is the case of Baby D., *aet.* six months; flabby, anemic, rachitic, and constipated; weight, twelve pounds; taking 2.75 per cent. fat and only 1 per cent. proteids. A gradual increase of the proteids to 3 per cent., and of the fat to the same level, resulted in the accession of one pound to the weight in three weeks.

A point never to be forgotten is that an infant may suffer from proteid insufficiency, although of normal, and even of overweight. Increasing weight, indeed, often with constipation, is quite frequently one of the earliest indications of rickets. The weight, it must be remembered, is only one of the factors in the problem of nutrition. Illustrating this is Baby R., *aet.* ten months, weighing twenty-two pounds and twelve ounces (three pounds above the average); muscles flabby; slight beading of the ribs; six teeth; had been weaned six weeks previously, and was taking 1 per cent. proteid, 4 per cent. fat, and 7 per cent. sugar. A mixture containing 1.75 per cent. proteids and 2 per cent. fat, with oatmeal as a diluent, relieved the constipation rapidly, and produced other signs of improvement. The constipation in this child was typical of fat-intolerance; *i. e.*, the stools were dry, light in color, and rolled from the napkin without soiling it. Such stools are not composed of undigested casein, as formerly supposed; but consist almost entirely of soap and fatty acids. Fat, however, may appear in the stools in other forms, viz., as soft, yel-

lowish-white masses, occasionally resembling scrambled eggs; or the stools may have a greasy appearance, or may be white or greenish-white in color and have an acid odor (butyric acid). When fat indigestion assumes these characteristics, there is usually diarrhea or, at least, the stools are not constipated. Stools presenting the appearances just described, whether there be constipation or diarrhea, call for a decrease in the fat; and constipation arising from this cause may very frequently be relieved by decreasing or omiting the fat, and increasing the proteids.

Because of habit, and because of the lessened tone of the great bowel (*from low proteid-feeding*), it is often not sufficient to alter the percentages in order to relieve the constipation; but the use of oatmeal as a diluent, and of maltose and laxative drugs, must be resorted to. One thing is certain, viz.: that the mere increase of fat will not relieve constipation, indeed, increase of proteids is often more efficacious, because these infants frequently owe their constipation to deficient muscular tone. One of the dangers of high fat-feeding is the production of symptoms of acidosis, viz.: vomiting, fever, and more or less severe toxic symptoms. Many of the attacks of acute indigestion in infants and young children are of this nature, and may be very materially lessened, when they recur repeatedly, by diminishing or omitting altogether the amount of fat in the dietary.

Stationary or decreasing weight is a common symptom of proteid insufficiency; although this may happen when the fat is in excess. If the other ingredients appear to be correct and there is no gain, or actual loss in weight, increase in the proteids is indicated; and this should be done, even *if indigestion and curds are provoked or increased thereby.* Very often, indeed, these symptoms may be made to disappear by diminishing or eliminating the fat, and sometimes by decreasing the sugar; but if these measures do not have this result, the increased amount of proteid should be continued in spite of the stools, since the additional nourishment afforded by the increased nitrogenous food may so improve the digestive and assimilative powers that the curds and other signs of indigestion will gradually disappear. In a word, the character of the stools may be neglected if the infant is gaining and developing, even though slightly.

If, after a reasonable time, the weight does not increase or the infant otherwise improve, and the evidences of proteid intolerance persist, resort may be had to peptonization or to digestive tonics, such as gentian and soda, nux vomica, pancreatin and, specially, hydrochloric acid. Sometimes increase in weight and improvement generally may be attained in cases of this nature by the substitution of malt or cane-sugar for lactose, or by the addition of cereal flours in the form of decoctions of gruels, if they are not already in use. Buttermilk often answers admirably in cases of proteid insufficiency in infants who cannot digest or assimilate easein, or some or all of the elements of ordinary cow's milk. The usual indication for this preparation is fat-indigestion, but it is of great

value in those cases in which the proteids cannot be assimilated. It should always be freshly prepared, and, preferably, home-made (the commercial article is not advisable for use in infants). I have always employed it boiled, and mixed with definite quantities of wheat-flour (½ oz.) and cane-sugar (2 to 3 per cent.). For temporary use, and in very young infants, I have occasionally employed, with great success, the buttermilk conserve of Biedert and Selter—so-called Bu-co Buttermilk. The value of buttermilk is well shown in the case of Baby S., *aet.* fourteen months; always poorly nourished; severe enteritis in May from which he never rallied entirely; so that in September he presented the picture of profound malnutrition, viz.: emaciated, fretful, sleepless, with recurring attacks of diarrhea, alternating with constipation. Because of the disturbance it invariably excited, cow's milk had been withheld for several (four) months, the child being fed upon gruels, eggs, broths, and zwieback. The diet was at once limited to buttermilk, with a resultant gain of fifteen pounds in six months. Similar to the foregoing, was the case of Baby C., aged two years. Here the child, suffering from malnutrition following an enterocolitis, acquired a year previously, had been deprived of cow's milk for an equal length of time. As a consequence of repeated failures, the mother was very reluctant to try cow's milk in any form, but finally consented to use buttermilk—with an improvement as remarkable as in Baby S. (exact amount of gain mislaid).

I fear that these rather desultory remarks have lost much of their force from the disconnected manner in which they have been presented. Hence, a brief summary of what I have endeavored to say, will not, I think, be out of place:—I have desired to emphasize the great importance of a sufficiency of proteids in the infant's dietary; to show how frequently infants suffer from a want of this element, because of the misconception (still prevalent) that it is the casein of cow's milk which is the most injurious to, and difficult to digest by, the human baby; that this idea had its origin in the belief that the curds commonly seen in the infant's stool were undigested casein, while, in reality, in the majority of cases, they are composed of fat—although casine curds do occur; that this belief has led physicians in the past, and is still leading them, to feed babies with low proteids or upon proprietary foods deficient in this element; that fat is better tolerated before the sixth month than after, in winter than in summer, is the cause of a peculiar form of constipation, and is particularly obnoxious in all acute digestive disturbances, and may provoke a definite and often severe train of symptoms due to acidosis; that a deficiency in proteids is a common cause of malnutrition, rickets, scurvy, anemia, feeble circulatory, digestive and assimilative powers and constipation; that normal or increasing weight may occur with deficient proteids, and, with constipation, is frequently an early sign of rickets; that when these symptoms occur, the proteids should be increased, often with diminution of the fat, especially if there

is constipation, or if there is diarrhea with fatty curds; that when increased amounts of proteids are indicated, but apparently not tolerated, even though the fat be reduced, resort should be had to peptonization and digestive tonics,—although it will repeatedly be found that perseverance in the increased proteids will frequently cause the apparent evidences of their injurious influence to disappear; that buttermilk is a convenient medium for exhibiting the proteids, when they are otherwise not well tolerated; that the stools may be practically disregarded, so long as the infant is gaining regularly and developing naturally; and, finally, as will have been observed by those who have grasped the full significance of these remarks, that simple dilutions of whole milk with cereal decoctions, and the addition of sugar, are sufficient, in very many cases, for the successful nourishment of infants.

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REPORT OF CASE AND EXHIBITION OF SPECIMEN OF UNDESCENDED TESTIS.

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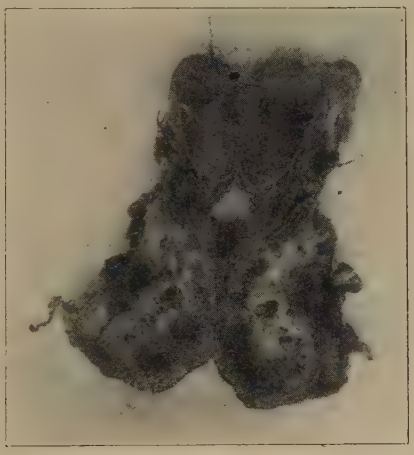
Male, aged twenty-eight years, butcher, family history negative. When patient was nine years old, while attempting to vault a post, he was impaled upon the top and subjected to the injury, on which occasion he al-



leges his testicle disappeared into the abdomen and remained there. He experienced considerable pain at the time, but was able to walk home, and was not sufficiently sick to mention the occurrence to his parents.

Two years later his father discovered the condition of the retained testicle while patient was bathing.

He suffered no pain or inconvenience during the intervening years between this accident and a second injury, which occurred January, 1910. At this time, when twenty-eight years of age, while lifting a hind quarter of beef, weighing about 200 pounds, he felt a tearing, accompanied by a sharp pain in the right inguinal region, and on examining himself, saw and felt a small tumor the size of a pigeon's egg, which caused considerable pain and discomfort when standing or walking, and a lesser degree of discomfort when at rest.

The patient was seen by me the latter part of January, 1910, three weeks following the injury.

Examination revealed an enlargement in the right inguinal region, just external to the internal ring. The enlargement suggested a retained testicle, though harder and more globular than the normal gland. It had apparently reduced in size since the injury, and was only slightly sensitive.

The patient was quite positive in his statement that he had not been a congenital monorchid, and that his double injury was the cause of this condition.

On cutting down upon the inguinal canal, the enlargement felt from the outside was exposed and found to be attached to the spermatic cord. When traction was exerted upon the cord from the internal ring, the second enlargement presented in the specimen exhibited, which possesses more the appearance of the normal testicle than the external enlargement, was delivered from the internal abdominal ring.

Closer examination of the structure revealed that an incompletely formed testicle had been retained in the abdomen, and that the descent of the vas and epididymis had taken place, at all events, as far as the external abdominal ring, or, if the patient's statement can be taken, had descended to the scrotum, having been subjected later to dislocation backwards, as a result of direct injury.

The case, therefore, seems to be that of monorchidism, with descent of the vas and epididymis.

The examination of sections confirmed this conclusion, the distal enlargement proving to be the epididymis, with evidence of acute and chronic inflammation, and the interior portion proving to be, as it appears grossly, the body of the retained testis.

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MEDICAL AND SURGICAL PROGRESS.

RECENT ADVANCES IN CANCER RESEARCH.

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23. Abderhalden, Koelker and Medigreceanu (*Zeitschr. fuer Phys. Chem.,* Vol. 62, p. 145, 1909).
24. Abderhalden and Menligreceanu (*Zeitschr. fuer Phys. Chem.,* Vol. 64, p. 265, 1910).
25. Abderhalden and Pincussohn (*Zeitschr. fuer Phys. Chem.,* Vol. 64, p. 277, 1910).
26. Abderhalden (*Zeitschr. fuer Krebsforschung,* Vol. 9, p. 266, 1910).

27. Freund (*Biochemische Zeitschr.*, 1910).
28. Neuberg (*Biochemische Zeitschr.*, 1910).
29. Freund and Kaminer (*Wine. klin. Wochenschr.*, Vol. XXIII., p. 1221, 1910).

In the present review it will be possible to consider only a portion of the recent literature of cancer research, and therefore, we will confine ourselves here to the consideration of some recent work regarding the parasitc origin of cancer and some of the advances regarding the chemistry of tumors.

Some years ago both Sanfelice and Leopold published results of experiments regarding the etiological relation of Blastomyces and cancer in which they showed that Blastomyces might be cultivated from pieces of tumor tissue.

Leopold in his first published article was able to report on the recovery of cultures of Blastomyces from human tumors in 4 out of 20 cases. He used as a rule, tumors which were not ulcerated; he examined pieces of tissue which were being invaded by tumor cells, thus pieces far removed from the surface and pieces in which young and actively growing cells were present. In every case all aseptic precautions were followed and the possibilities of accidental infection were reduced to a minimum.

In his later work he reports on additional experiments to obtain cultures of Blastomyces from human tumors. Including his earlier experiments he now reports on 64 cases. In 37 cases he obtained cultures of Blastomyces; in 13 Blastomyces were demonstrated only in a hanging drop and in 14 no Blastomyces were found. It is interesting to note that in his last series of 23 cases he was able to find Blastomyces in all but one.

In 11 cases in which he placed in the cultural media pieces of tissue not taken from malignant neoplasms (5 of these were myomata of the uterus) his results were negative.

In tabulating his results he does not state definitely in all cases whether or not his cultures of Blastomyces were contaminated at first. However, it is evident that in 20 of these cases in which he obtained cultures of Blastomyces, these were at first contaminated, and in only 10 cases did he obtain pure cultures of Blastomyces. 13 other cases seem to have been contaminated, but in this respect his reports are not sufficiently definite to permit any certain statement. However, it is apparent that in the majority of cases, Leopold was not dealing with a pure culture of Blastomyces; whether the bacterial contamination was accidental or whether it arose from organisms present in the tissue cannot be stated.

Sanfelice in his later work, has confined himself almost entirely to the experimental production of tumors by the inoculation of Blastomyces; he also reported, however, on the isolation of a culture from a tumor of a dog (lympho-sarcoma), and this culture he used in a number of his experiments. In his experiments he used, dogs, cats, and rats as experimental subjects.

When the Blastomyces alone were injected, no true neoplasm resulted; a tumor was noted composed chiefly of the organisms which had proliferated *in situ*. If, however, Blastomyces and their toxins or their toxins alone were injected, tumors were noted which Sanfelice considered to be true neoplasms. The general features of these tumors were similar in the various experimental animals. He considered a large mass,

usually noted in the great omentum, as the primary tumor, and the collection of cells noted in the liver, spleen, lymph-nodes, kidney, and lungs, as metastases; also other smaller tumors in the peritoneal cavity, Sanfelice thought to be due to the loosening of cells from the original tumor mass in the omentum, thus metastases by wandering of cells in the body cavity.

He also reports the production of an adenocarcinoma of the breast in a bitch as the result of an injection of the toxins of Blastomyces into the subcutaneous tissue near the breast, but gives no description of this tumor. The injection of Blastomyces into the præputium of dogs led to the formation of a tumor which Sanfelice classes as a sarcoma, considering it to be a tumor similar to the transplantable lymphosarcoma of dogs. He has transplanted thirteen of the above-mentioned peritoneal tumors of rats, which had been produced by the intraperitoneal injections of Blastomyces into other rats, and has been able to carry these transplantations through three to five generations; the tumor remained true to its original type in all cases.

As a result of these experiments, Sanfelice was led to believe that the Blastomyces stood in etiological relation to neoplasms, and he therefore attempted to obtain a serum which would contain antibodies for both Blastomyces and their toxins, and with which he might combat these neoplasms. He prepared a serum which protected a rat from the injection of a lethal dose of Blastomyces and their toxins. He believed that this antiserum contained substances which destroyed the organisms and neutralized their toxins. He treated eleven dogs which showed spontaneous tumors with this antiserum, and was able to cure ten, and note a marked reduction in the size of the tumor of the other dog, which died of intercurrent disease.

The tumors which apparently resulted from the injection of Blastomyces, Sanfelice considers as true neoplasms, but both the micro-photographs and the descriptions of the tumors show many similarities to tumors produced by foreign bodies. The tumors produced by the injection of Blastomyces contain giant cells, and are composed of large endothelial cells; the so-called metastases appear most frequently in places where lymphatic tissue pre-exists.

Sanfelice advances the theory that Blastomyces and their toxins, especially the latter (since injection of a large quantity of the organisms alone leads only to a general infection), stimulate cells to proliferation, cause a change in form and function (anaplasia), and thus change the chemism of the cells. When these cells are carried to parts of the body distant from the original site, they retain the power of unlimited proliferation, and thus constitute true metastases. The Blastomyces remain in the cells of the original tumors but are present in a changed form; they continue to produce toxins which act upon the cells. He draws an analogy between this action of the Blastomyces and "experimental intoxication" with the products of bacteria.

Leopold does not reach as definite conclusions as does Sanfelice, but he considers the Blastomyces as at least one of the etiological factors in the production of neoplasms.

Galeotti and Pentimalli have inoculated into dogs and rats cultures and toxins of Blastomyces. They were not able to produce tumors when sterile cultures were injected, but the cell contents of the Blastomyces (obtained by crushing the cells and expressing the juice under hydraulic pressure) produced new growths if not freed from all Blastomyces. Injection of either the nucleo-proteids or the autolytic products of the

Blastomyces led to the information of tumors. The tumors in rats Galeotti and Pentimalli class as adenomata, simple epithelial proliferations and in two cases as carcinoma. In dogs they produced lymphangioendotheliomata and sarcomata and in one case an adenoma. They conclude from their results that the endotoxins of Blastomyces cause metaplasias and compare this cell proliferation at least in a degree with the local metaplasias produced by the injection of Scharlach R. and other substances. The reactions which Galeotti and Pentimalli noted were however distant from the site of injection and furthermore they claim to have demonstrated metastases in one experiment. They withhold their opinion as to the relationship between Blastomyces and malignant neoplasms.

In connection with the theory of a parasitic origin of neoplasms some experiments which Lewin carried out some years ago appear to be of interest. He transplanted pieces of an ovarian carcinoma removed from a human, into the peritoneal cavity of a dog and obtained tumors which were in no way distinguishable from the usual foreign body granuloma. When these tumors from the peritoneal cavity of the first dog were transplanted into other dogs, a tumor developed differing somewhat from that noted in the first dog. This second tumor was transplanted through four more generations. Lewin considered this tumor noted in the later generations to be a sarcoma, but it seems doubtful whether these later tumors were not granulomata like the first one.

Lewin is rather guarded in his conclusions but suggests the probability that some agent present in the human ovarian carcinoma was inoculated with the tumor substance into the first dog, and from this animal into the other ones. This agent he thinks, must have been the causative factor in the production of the so-called sarcomas.

Behla, who supports the theory of the parasitic origin of cancer, believes that the tumors which Sanfelice and Leopold noted following the injection of Blastomyces were granulomata. He also believes that the recovery of Blastomyces from human tumors was due to accidental infection of the tumors.

Another theory of the parasitic origin of tumors which has developed recently, connects acari and neoplasms.

In a series of twenty-two tumors (most of them early epitheliomata), Borrel has shown that acari which he classes as Demodex, a common house mite, may be found in the tumor or in close relationship with the tumor. Almost all these tumors were removed from hospital patients, that is patients of the poorer classes. Borrel believed that the acari represented the intermediate hosts of the true cancer parasite and thus explained why acari were found only in early tumors, believing that they died and disappeared after inoculating the true cancer parasite.

Saul, spurred on by Borrel, found in tumors from human beings, mice, dogs and horses, acari which differed from those found by Borrel and which Saul considered to be a new species of Tarsomenus. These acari were found not in early but in large well-advanced tumors. Dahl, who studied the acari which Saul found, shows that the Tarsomeni are of the same class as the acari which produce gall or tumors in trees. Both Saul and Dahl incline toward the belief that these acari may be the causative agents of cancer and think that their action in this respect is not due to mechanical irritation, but to some product of the adult parasite or of the ova deposited by the adult. They suggest that the reason that acari have not been found before is due to the presence of the ova alone, and the disappearance of the adults from the living tumor.

This interpretation by Saul and Dahl of their observations is attacked by Reuter, who claims to have proved by experiment that it is impossible to prevent mites from entering jars closed in the usual manner (Saul had found the Tarsomeni in old tumor material which had been preserved several years), and also points out that the bodies which Saul and Dahl considered as ova, were much smaller than the usual ova of Tarsomeni. Saul and Dahl had laid much stress upon the fact that one and possibly two new varieties of Tarsomeni had been found in the tumors, believing that this pointed toward these acari, being the causative agents of cancer.

Reuter shows that although considerable work has been done in classifying Tarsomeni, still new varieties are being found constantly, and that the discovery of a new variety in tumors is therefore not very astonishing.

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For many years attempts have been made to demonstrate differences between the proteids of normal cells and tumor cells. As yet no such differences had been demonstrated. Abderhalden has shown that tumors contain more glutaminic acid than do normal tissues, but he calls attention to the fact that this demonstrates no specific cancer proteid, but may be due to a difference in the relative quantities of various proteids in the tumors. Abderhalden and Medigreceanu have compared the tyrosin, glutaminic acid and glycocoll contents of tumors from various animals (cow, rat and mouse), but were not able to show differences in their relative contents of these substances.

The enzymes of the tumor cells have been actively investigated and Neuberg, Emerson, Blumenthal and Wolff, claimed that when cancer tissue and normal tissue were allowed to undergo autolysis in a mixture, more incoagulable nitrogen containing substances were produced, than when cancer tissue and normal tissue were autolysed separately. It was also claimed that cancer tissue caused a more rapid splitting of proteids than does normal tissue.

Hess and Saxl on the other hand, were unable to show that cancer tissue showed more active proteolytic action than normal tissue, nor were they able to show that more incoagulable proteids were produced when cancer tissue and normal tissue were allowed to autolyse together than when allowed to autolyse separately. On the contrary, they found that the actual incoagulable nitrogen bearing substances noted in the autolysed mixtures were usually smaller in quantity than should have been found according to their computations. They were not able to confirm Neuberg's results regarding the finding of smaller quantities of the substances formed by the splitting of the albumoses when cancer tissue and normal tissue were allowed to autolyse together than when two normal tissues autolysed separately.

Kepinow and Lieblein have both confirmed the results of Hess and Saxl, and found the non-coagulable nitrogen containing substances produced by combined autolysis of cancer and normal tissue to be less than when such tissues were autolysed separately.

Blumenthal, Jacoby and Neuberg have, however, in further experiments, obtained results similar to their first ones; they find that this difference between the combined autolysis of tumor tissue and normal tissue and the combined autolysis of two normal tissues exists only in certain tumors so that this divergence between their results and those of Hess and Saxl may be due to the kind of tumors used.

Abderhalden and Rona have been able to find no difference between

the splitting action of adenomatous tumors and normal tissue upon a proteid. They found, however, that scirrhous cancer had no splitting action whatsoever.

On the other hand, Abderhalden, Koelker, and Medigreceanu found that juices of cellular cancers (expressed by hydraulic pressure), acted more rapidly upon higher proteids than did similar fluids from normal cells.

Abderhalden and Medigreceanu who used optically active albuminous products in their experiments noted that the ferments of tumors occasionally acted differently on a certain kind of peptone than did the ferments of normal tissues. They were not able to demonstrate any connection between the rate of growth of the tumor and its proteolytic activity.

Abderhalden and Pincussohn showed that when d.-alanyl-glygyl-glycin was acted on by the ferments of tumor cells it was hydrolysed in a distinctly different manner by certain tumors than when acted on by the ferments of normal tissues. The splitting of this substance produced different intermediate products in the two cases.

Abderhalden contends that this difference in the enzymes of tumor cells, points to a difference in the entire chemical structure of tumor cells and that the metabolism of tumor cells must therefore be different from that of normal cells. He suggests that the abnormal catabolic products of these cells may be toxic to normal body cells. The abnormal ferments may also cause changes in distant cells while the relations between various groups of cells or organs (as expressed by hormones or activators), may be interfered with by these abnormal ferments. Such changes, he suggests, may give rise to the cachexia of cancer cases.

Finally, we shall consider certain relations which have been shown to exist between the serum of cancerous and non-cancerous individuals and cancer cells.

Freund has found that there is in the blood of non-cancerous individuals, a substance which causes lysis of cancer cells, but which has no effect on cells of organs from cancerous or non-cancerous individuals. The blood of cancerous individuals does not destroy either cancer cells or cells of organs, but the addition of blood of cancerous individuals to the blood of non-cancerous individuals prevents the lytic action of the latter upon the cancer cells. The first substance is contained in the euglobulin fraction of the serum; the protecting substance is carried by a substance similar to nucleoglobin. Neuberg working independant in somewhat different manner has come to very much the same results as does Freund.

When some of the cell-destroying fraction of non-cancerous serum was added to cancerous serum Freund and Kaminer found that they recovered less than the calculated amount of the euglobulin fraction (the bearer of the lytic substances), and therefore concluded that the protecting substance in cancerous serum destroys the lytic substance of non-cancerous serum.

Freund has noted that when serum of cancerous individuals was added to cancer extract a cloudiness was produced; hence, Freund and Kaminer extended their experiments regarding the production of this cloudiness and found that it was cleared by addition of serum of non-cancerous individuals. They further tested the reaction of cancer extracts with sera in fifty-four cancerous individuals and in forty-five non-cancerous individuals; and since their results were constant (cloudiness produced in all of the first cases and none produced in the latter), they concluded that this reaction is specific for cancer.

THE MEIOSTAGMIN REACTION.*

A REVIEW OF RECENT LITERATURE.**

By Leo A. Juhnke, M. D., of Chicago.

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3. (*Wiener klin. Wochenschr.*, Nos. 27, 30, 33, 1910.)
4. (*Wiener med. Wochenschr.*, No. 26, 1910.)
5. (*Medizinische Klinik*, No. 29, 1910.)
6. (*Deutsche med. Wochenschr.*, No. 43, 1910.)
7. (*Zeitschr. fuer Immunitætsforschung*, Vol. 6-7, No. 1, 1910.)
8. (*Biochemische Zeitschr.*, Vol. 28, No. 1; Vol. 29, Nos. 1, 2, 3; 1910.)
9. (*Zeitschr. fuer Infectionskrank. der Hausthiere*, 1910.)
10. (*Pathologia*, Nos. 32, 39, 43, 1910.)
11. (*Il Policlinico*, No. 25, 1910.)
12. (*Biochemica e terapia sperimentale*, No. 11, 1910.)
13. (*Societa med.-chir. Pavia*, No. 1, 1910.)
13. (*Corriere Sanitario*; No. 18, 1910.)
14. (*Academie med. di Padova*, June, 1910.)
15. (*Societa medico biologica Milanese*, June, 1910.)

Since decreased surface tension has been observed as a frequent accompaniment to immunity reactions, Ascoli and Izar, of the University of Pavia, more lately of Catania, Italy, decided to investigate the phenomenon, and from their investigations resulted the Meiostagmin reaction. The principle of the reaction is based upon the fact that when a specific antigen is added to a specific serum, a lowering of the surface tension of the serum results. There are various ways of determining the surface tension of a liquid, but all experiments until recently have been conducted with the drop method, using Traube's stalagmometer.

Serum of a typhoid patient (typhoid because the reaction was first tried in typhoid fever) and normal serum for control are diluted with normal salt solution in proportion of 1-20, this having been found convenient to work with. The antigen is an alcoholic extract of typhoid bacilli prepared according to the method of Neisser and Shiga, diluted with normal salt solution in proportion of 1:25, 1:50, 1:100, 1:500, the degree of dilution varying with the strength of the antigen used.

The reaction is as follows:—

To 9 c.c. of the 1:20 diluted typhoid serum is added 1 c.c. of diluted antigen (its strength having been previously determined).

*Read before the Michael Reese Hospital Clinical Society, December 9th, 1910.

**So many references have been consulted in this review that too much space would be utilized in presenting them individually. Consequently they are grouped for convenience under the journals in which they appeared.

To 9 c.c. of the 1:20 diluted normal serum is added 1 c.c. of the same antigen.

To 9 c.c. of each of the diluted sera is added 1 c.c. of normal salt solution for control. See table.

9 c.c. of 1-20 diluted Typhoid Serum	NUMBER OF DROPS Typhoid Serum		9 c.c. of 1-20 diluted Normal Serum	NUMBER OF DROPS Normal Serum	
	Before Incubation	After 2 hours' Incubation		Before Incubation	After 2 hours' Incubation
Plus 1 c.c. Typhoid Antigen diluted 1-100	58.0	61.2	Plus 1 c.c. of 1-20 diluted antigen	57.0	58.0
	58.1	61.2		57.1	58.1
Plus 1 c.c. .85% Salt Solution	57.0	58.0	Plus 1 c.c. .85% Salt Solution	57.1	58.0
	57.1	58.0		57.2	58.1

The surface tension of each of the four liquids is tested immediately. They are put in an incubator at 37° C. for two hours, thus allowing antigen and typhoid serum to combine. At the end of two hours they are removed from incubator, cooled to room temperature and the surface tension is again determined.

It has been shown that if antibody is present in the serum and binds the antigen, the surface tension of that serum is decreased and a greater number of drops is contained in a given volume of serum when measured by this method. The antigen can be used in varying strength and reacts positive even in high dilution. By using too strong solutions it is possible to bring about a decrease in the surface tension merely by the liquid with which the antigen is extracted. Hence a previously titrated strength of antigen is used and, as is evident, the one which gives the greatest differences between the reaction and the control is the most desirable one to use.

The differences are small, 1 to 3 drops in some cases, whereas in other cases even up to 8 drops, but sufficiently decisive to enable one to read a positive reaction easily. Arbitrarily Ascoli and his associates have set a limit beyond which a reaction must go before it is considered positive, and they required a difference of 2 drops for a positive reaction, to exclude errors of technique. More recently Ascoli has tried different methods of increasing the intensity of the reaction and of making readings doubly certain. By trying numerous chemicals he found that a certain amount of dilute acetic acid or methyl alcohol, when added to the sera, increased the intensity of the positive reaction several times, whereas it had no effect upon the controls.

The reaction probably occurs in every disease in which an antigen of the etiological factor of the disease can be obtained, therefore in every infectious disease of known bacteriological cause, of parasitic diseases, etc. It also occurs in cases of malignant tumors, here using an antigen made of tumor extract. It seems to be a specific one needing for its taking place on the one hand the antibody, here named "meiostagmin," produced in the patient in the course of the disease, and on the other hand the specific antigen. That the specific antigen in any given case

alone will bring about this reaction and no other, has been demonstrated conclusively. Furthermore the enormous dilutions in which an antigen may be used in certain cases and still give positive results speaks similarly for that fact. Thus in testing out a strongly typhoid immunized horse serum Izar obtained a positive reaction with dilutions of antigen up to 1 in 100,000,000. To further prove the specificity of the reaction and to show that the meiostagmin bodies are anchored only to their specific antigen Ascoli successfully tried the well-known binding experiments. Gosharrin went further to test its specificity. He injected three types of tubercle bacilli—human, avian and bovine—into different guinea-pigs to determine whether specific meiostagmin bodies were produced in these animals. The respective disease was produced in each of the guinea-pigs, as was later confirmed by autopsy findings and it was shown that the meiostagmin reaction was specific for the type of bacillus injected.

Although the reaction was first tried in typhoid fever no series of cases is reported by the experimenters, as their first investigations were not directed so much to prove its specificity as they were to perfect the technique. But since then their results have been verified by Vigano, who tried the reaction in 6 cases of typhoid fever in which agglutination tests for typhoid bacilli were positive in dilutions of 1 to 100 and negative for paratyphoid A and B. In all of these cases the meiostagmin reaction was correspondingly positive to typhoid antigen and negative to paratyphoid A and B, again showing its specificity. Later Izar has reported another small series of cases, 9 in number, in which the reaction was decidedly positive, whereas in 18 other diseases not typhoid, but in which typhoid antigen was used, all were negative.

Izar investigated the reaction in syphilis. As an antigen he used an alcoholic ethereal splenic extract from a syphilitic fetus, prepared according to certain directions. He tried the reaction in a series of 90 clinically positive cases of syphilis, these in all three active types of the disease, as well as in the latent state. The reaction was positive in about 90 per cent. of cases clinically positive syphilis, a good percentage of them in the latent state. Of the 18 clinically suspicious cases, the Wassermann was positive in 6 instances, and the meiostagmin positive in each of these. Out of the 12 negative Wassermann cases there were 4 meiostagmin positive; in 8 of these cases both reactions were negative. To test the specificity of the reaction for syphilis the writer reported 104 various non-syphilitic diseases in which the reaction was tried with syphilitic antigen. Only in one of these 104 cases was the reaction actually positive, this being a case of erythema nodosum, whether or not on a syphilitic basis is not known.

Izar also tested the reaction in a series of 40 clinically positive cases of tuberculosis of the lungs. In 35 of these cases the tubercle bacillus was found microscopically. In all but one case was the meiostagmin reaction positive. In 5 other cases in which the Pirquet was positive, but in which no bacilli were found, the meiostagmin reaction was positive in each case. No explanation is offered for the one in which it was negative. As these were the first experiments with tuberculous sera, the cases selected were perhaps too far advanced to consider the value of the reaction in beginning tuberculosis, or to estimate how early a reaction can be obtained after infection. Gosharrin proved that in guinea pigs and rabbits experimentally infected with tubercle bacilli the reaction was positive as early as the fifth day after inoculation. Izar tested the reaction

with tuberculous antigen in 74 non-tuberculous diseases as a control, and in each case was the reaction negative. DeEste, of Milan, has investigated the reaction in 15 cases of surgical tuberculosis controlled by positive ophthalmic reactions, by Pirquet reaction as well as by operative findings, and found it positive in every case. He also tried the reaction in advanced tuberculosis of the lungs and in each case was the reaction positive, however with greater intensity than in the surgical cases.

From the analysis of these two series we can conclude that the reaction is positive only in active foci—the more active the focus, the more intense the reaction. It leaves out the latent cases but therefore of so much more significance is a positive reaction.

The reaction has also been tried in 6 cases of anchylostoma duodenale, and in each case was the blood serum meiostagmin positive, whereas in 20 control cases in which anchylostoma antigen was used, the reaction was negative each time. Among the controls were two cases of anguillula intestinalis in which the reaction was negative to anchylostoma antigen. In echinococcus disease, of which Izar had eleven cases, all in household animals, the reaction was positive in each; in 7 cases of healthy animals the serum reacted negative to echinococcus antigen.

Perhaps the greatest value of the reaction lies in the fact that it is positive in cases of malignant tumors. Ascoli's interesting results with a transplantable rat sarcoma, led him to try the reaction immediately on malignant tumors of the human, using an antigen made of malignant tumor extract. His present method of making an antigen is as follows:—

The tumor, preferably the undegenerated portion of it is cut into fine slices or ground to pieces. It is spread out on glass plates in a very thin layer and dried in a temperature of 37° C. The dried residue is powdered and extracted with methyl alcohol in proportion of 5 gm. to 25 c.cm., put in a closed vessel and kept for 24 hours at a temperature of 50° C., shaking occasionally. It is then filtered hot, cooled to room temperature and filtered. This process can be repeated several times, each for 24 hours at a temperature of 50° C. The final residue is then dried again, powdered and extracted with ether under the same conditions. The filtered extracts are evaporated and the residue dissolved in the smallest amount of methyl alcohol and may be kept as such.

Titration of the antigen. The antigen is now titrated to determine its strength. Dilutions of 1 to 25, 1 to 50, 1 to 100, 1 to 200, 1 to 1000, etc., are made, using normal salt solution as the diluent. One c.c. of each of the respective antigens is added to 9 c.c. of 1/20 diluted normal serum and incubated for two hours. Surface tension of the mixtures are taken before and after incubation. The most desirable antigen is that one which after 2 hours' incubation gives a difference in the reading not greater than one drop.

In Ascoli's first series of 30 cases, 28 of which were carcinomata of stomach, uterus, mammæ, etc., 5 of which were still operable, 1 of 4 months standing, the reaction was positive in 29 out of the 30 cases. In 28 non-malignant diseases, including a few non-malignant new-growths the reaction was negative each time. Of interest here is the fact that serum from a carcinomatous patient gave positive meiostagmin reactions with sarcomatous antigen and vice versa—suggesting a fact which seems to conform to the views of modern pathologists and surgeons that there is less difference between sarcomata and carcinomata than hitherto supposed.

DeEste's series of 12 cases of malignant tumors all gave a positive meiostagmin reaction, whereas 10 cases of non-malignant tumors as lipomata, fibromata, goitres, etc., as well as 8 other surgical diseases were meiostagmin negative when tested with malignant tumor antigen.

Micheli and Cattoretti shortly after reported 18 cases of malignant tumors in 17 of which a positive reaction was obtained. The same

writers later report a series of 50 clinically malignant cases with a positive reaction in 90 per cent. Of the doubtful cases the reaction usually corresponded to the histological findings obtained either at operation or at necropsy. In no instance was the reaction positive in another disease, although it was tried in a fairly large number of cases by these writers. In 6 cases of leukemia tested with malignant tumor antigen a negative reaction was obtained each time.

In his second series of malignant tumor cases, 100 in all, Ascoli obtained a positive reaction in 93 per cent. Of these cases 16 were still operable, showing that the reaction is positive fairly early in the course of the disease. He designates 4 of these as early malignant tumors of 3 to 4 months standing. Of the 7 negative cases 2 were epitheliomata of the skin, 2 sarcomata of the skin, 1 a recurrent carcinoma of the mammæ, 1 a sarcoma of the popliteal space, and 1 an abdominal tumor of unknown description. In 40 cases of this series two antigens were used, one obtained from a rat sarcoma and the other prepared from a malignant tumor of the human. The reactions in which the human tumor antigen was used were much more positive, that is, they showed a greater differential between the reaction and the controls. In some cases this difference was as high as 10 drops, showing that the reaction is not so delicate, but decidedly positive. For controls to this series Ascoli tried the same antigen in 103 non-malignant diseases of various nature, and out of these only one reacted positive. This was a case of nephrolithiasis, in which a nephrectomy was done, and in which the microscopical examination revealed no malignant growth. The case is being investigated further to determine cause of the positive reaction.

De Angostini, of Milan, in a series of 27 malignant cases obtained a positive reaction in 85 per cent., but explains several negative cases as being negative perhaps because of faulty technique, thus lowering his percentage. Of the 27 controls in non-malignant cases every one reacted meiostagmin negative.

Stabilini, from Tausini's surgical clinic at Pavia, reports 32 cases of positive malignant tumors in which he obtained a positive reaction in 30 cases, approximately 94 per cent. In 49 control cases, which included 20 benign tumors, the reaction was negative in all.

Summary.

The reaction is positive in malignancy in from 85 to 95 per cent. of cases. Of its specificity there can be no question, only one case being reported in which the reaction was positive, after repeated trials, although the disease so far as can be determined is not malignant. As the individual is still living the case remains unsettled. As much or more can be said for the reaction in infectious diseases. No positive reaction was obtained with a specific antigen except in cases bacteriologically corresponding to the antigen.

The time of appearance of a positive reaction remains to be studied further. Though relatively early in the acute infections it is in tuberculosis that its early appearance is of value. As was stated above it appeared in experimentally infected animals as early as the fifth day.

It is in the early appearance of the reaction in malignant tumors wherein its greatest value will lie. This also remains to be studied further, although some important data are already on hand. Thus Ascoli reports it positive in 16 cases of operable carcinomas out of 100 malignant cases. Out of these 4 were early cases, in the third or fourth month of the disease.

GASTRIC ULCER: X-RAY DIAGNOSIS.

A REVIEW OF RECENT LITERATURE.

By E. H. Skinner, M. D., of Kansas City.

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2. Faulhaber: Zur Roentgendiagnostik des tiefgreifenden (kalloesen) Ulcus ventriculi. (*Muench. med. Wochenschr.,* Vol. 57, No. 40, Oct. 4th, 1910.)
3. Haudek: Zur roentgenologischen Diagnose der Ulzerationen in der Pars media des magens. (*Muench. med. Wochenschr.,* Vol. 57, No. 30, July 26th, 1910.)
4. Haudek: Die Roentgendiagnose des kalloesen (penetrierenden) Magengeschwuers und ihre Bedeutung. (*Muench. med. Wochenschr.,* Vol. 57, No. 47, Nov. 22d, 1910.)
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There is probably no field of *x*-ray effort in which the work of individuals stands out so prominently as in the use of the *x*-ray in the diagnosis of gastro-intestinal diseases. The names of Holzknecht, Rieder and Groedel (5) will stand out pre-eminently as pioneer fluoroscopists. While the work of these men is more exhaustive, we must not overlook the American pioneers, Williams (1) of Boston and Cannon (2) of Harvard Medical School. It was the experimental work, in which Cannon studied the motility of the gastro-intestinal tract in kittens, that paved the way for the satisfactory researches of Holzknecht and Jonas

(3). The observations of the clinician, Williams, are also acknowledged to have been of great service to these latter Viennese roentgenologists.

Following close in the wake of these men we cannot pass such names as Gottwald Schwarz, Haudek, Jonas (all associates of Holzknecht), Faulhaber, Jolasse, Goldammer, Cohn-Berlin, Albers-Schönberg; Pfahler, Leonard, Hulst of America; Hertz, Jordan and Barclay of England.

The fluoroscopic *x*-ray has proved of conclusive value in showing the filling defects, abnormal peristalsis, position and motility of stomach carcinoma. It has remained for some recent work, outlined above, to place at least one form of gastric ulcer upon a demonstrable *x*-ray basis. This type is the deep, penetrating ulcer of the lesser curvature, whose base before penetration, becomes adherent to the left liver lobe anteriorly or the pancreas posteriorly. The demonstration of the superficial stomach ulcer by the *x*-ray still holds forth a great future in research effort. Some recent literature, which will be reviewed in a later paragraph, has indicated that there was a most plausable possibility to demonstrate the site of superficial gastric ulcer by the adherence of portions of bismuth salts to the crater of the ulcer. Unfortunately, these claims are based upon but a very few cases and of these only the smallest per cent. came to an operation or post-mortem. Again, Hemmeter's efforts do not carry conclusive evidence, in that his experiments upon animals have not been duplicated by others, and his clinical cases were not proven. Jolasse's cases were few, also. Haudek and Faulhaber (l. c.) attempted to study out carefully the same technique of Hemmeter and Jolasse and failed to reach the same conclusions. Now, with all due courtesy and esteem to the gastro-enterologists, Hemmeter and Jolasse, it must be conceded that if trained roentgenologists such as Haudek and Faulhaber have failed to corroborate their findings, we must pause to consider the recent claims of Adler and Asbury (l. c.). Haudek and Faulhaber (l. c.), independently but contemporaneously, have published some splendid articles upon the positive diagnosis of the deep callous and perforating gastric ulcer. They have given definite fluoroscopic signs by which the ulcer base may be determined to be adherent to the pancreas or liver.

The technique of various observations reviewed in this essay is based upon the original work of Rieder of Munich. It consists in the ingestion by the patient of a bismuth meal composed of about 300 to 400 gms. of wheat pudding in which is incorporated about 40-60 gms. of bismuth subcarbonate or carbonate. Originally Rieder used the subnitrate of bismuth but for this has been substituted the carbonate by most of the continental roentgenologists. The English and American *x*-ray operators are partial to the oxychloride, which was first recommended by Hertz (7).

Hertz studied the various bismuth salts, when it was found that several ill-effects, that had been attributed to methemoglobin in the blood and nitrate poisoning, were produced by the decomposition of the subnitrate of bismuth. He found also that the carbonate or subcarbonate (the same substance, U. S. Dispensatory, Vol. XVIII.) of bismuth neutralizes the free HCL in the stomach; hence the important influence of the free acid upon the control of the pylorus is lost and the rate of emptying becomes abnormal although the movements are not altered. The oxychloride is not changed in the least by the stomach or intestinal secretions, and therefore answers the purpose of an unchangeable radiographically opaque substance.

The bismuth pudding is then, after ingestion, observed in the stomach upon the fluoroscopic screen. These observations are conducted in an

absolutely dark room, with appropriate x-ray apparatus that will protect the patient and operator from any possible ill-effects. That this is being done without danger cannot be gainsaid, notwithstanding the woeful observations of many who have not studied out the basic principles of protected fluoroscopy.

It may be well at this point to comment upon the superiority of fluoroscopy over radiography in the study of the gastro-intestinal tract. The radiograph reveals only the one single short phase of the functionating stomach. To one who has studied the changes in the gastric outline during peristalsis, it is clear that the single picture is of no elemental value. Bioroentgenography (8), or the moving *x*-ray picture, while approximating the fluoroscopic values, is too expensive to be practical and the technique is exhausting and liable to extrinsic errors. The close attention to the detail of the fluoroscopic examination as described later, in paragraphs descriptive of Haudek's and Faulhaber's work, will indicate several advantages which necessarily can only be appreciated by fluoroscopy. One cannot base conclusions of diagnostic value upon the single, or even repeated, radiographs, until a more practical and less expensive method of bioroentgenography is invented. The dangers of fluoroscopy are sufficiently preventable to standardize this simple method of examination.

Hertz (7) in a discussion of hour-glass stomach radioscopy (synonymous with fluoroscopy) points out that occasionally the appearance of a slight degree of hour-glass contraction is observed in cases which at subsequent operation show little or no narrowing, but that an ulcer is present near the centre of a lesser curvature. He suggests that the ulcer leads to a spasm of the circular fibres, the resulting spasmodic stricture appears and disappears during the progress of the examination; or if the stomach is observed during the ingestion of the meal, one would see the portion of the stomach above the spasmodic stricture fill with the bismuth pudding, then suddenly the spasm gives way and the filling of the stomach appears quite normal. If the ulcer is adherent to the liver and is upon the lesser curvature, as usually happens, we may have a permanent hour-glass constriction due to cicatrization about the ulcer. When the patient stands erect, the stomach tends to a vertical position, the ulcer is fixed and the line of tension is produced diagonally across the stomach and holds up the greater curvature where the line of tension meets it. The part of the stomach above the line of tension tends to sag down. He reports two cases of extreme hour-glass stomach due to the described phenomenon.

Barclay (6) draws attention to the first essential of fluoroscopy, *i. e.*, a clear idea of the normal stomach and the physiological actions of the muscular walls, including the tonic action and peristalsis. The upright position is urged in examination, which yields infinitely more information. He aptly compares our textbook knowledge of the stomach positions to any attempt to describe an India rubber ball, irrespective of the forces to which it is subjected. The outlines may be far from our idea of the normal, and yet the stomach may functionate properly. Barclay adheres to the Rieder type of normal J-shaped stomach; the loss of tonic action materially alters the character of the fluoroscopic shadow of and the level to which the contents descend. Barclay's observations upon the tonicity and peristalsis of the stomach in different pathological states (both functional and organic), are worthy of note, but not pertinent to this essay. Barclay consideres the stomach an extremely sensitive organ, in which spasmodic contractions enter into active lesions, especially does

gastric ulcer (he does not state the degree of pathological interest) cause spasmodic contractions. Sometimes this spasmodic contraction indicates the site of an ulcer if the clinical symptoms also point to this; otherwise such phenomena are beyond a provisional diagnosis of ulcer. He cites cases in which the bismuth pudding descends to this point of spasmodic contracture (usually at junction of middle and upper third) to form a cone-shaped shadow, then the spasm relaxes and the bismuth passes in a thick stream to the lower segment of the stomach. Massage of the abdomen may relax the spasm.

If the tone of the gastric musculature is good the resultant filling shadow will be of normal shape, with only an indication of the spasmodic area. If the tone is defective, the bismuth mixture drops to the lower pole. If traces of bismuth are left in the zone of the spasm after milk is drunk, and then the area massaged, it almost indicates ulceration with cicatrization giving rise to the spasm. These spasmodic conditions, whatever the cause, are found elsewhere in the stomach than in the middle portion. For instance, ulceration of the cardiac orifice will cause obstruction with dilatation of the esophagus. He cites one case where the esophagus was dilated and pouched, in which the post-mortem examination revealed an opening sufficient to admit two fingers, and a carcinoma only within an inch of the cardiac orifice. A second case showed a great dilatation of the esophagus but no obstruction, and a gastrostomy revealed an ulcer near the cardiac orifice. He also observes that ulceration of the pylorus likewise leads to the symptoms, fluoroscopic and otherwise, of pyloric obstruction. Barclay states conclusively that we have at our disposal, in an ordinary *x*-ray equipment, sufficient power for gastric diagnosis, if properly arranged. As in clinical methods the diagnosis must be arrived at by deduction; therefore, we must obtain all possible assistance from other sources. He considers that gastric ulcer may be diagnosed by reason of bismuth left in the ulcer or in the pockets of cicatrices, but that its site is more frequently indicated by the spasmodic contractions which play a part in all lesions of the stomach and complicate the diagnosis. The presence of pyloric obstruction and hour-glass stomach are comparatively easy to determine fluoroscopically, and the need of operative interference in carcinoma especially, is frequently likewise indicated before the clinical diagnosis can be arrived at.

While the foregoing reviews would indicate a most enthusiastic ability to render diagnostic assistance, we would courteously comment that there are not sufficient case reports attached to render the above assertions conclusive. The fluoroscopic symptoms described are didactically correct and are warranted upon physio-pathological grounds. It remains for their substantiation by operative or post-mortem proof. The statement that a medicinal course of treatment directed toward the probable clinical ulcer was productive of a recession of the described fluoroscopic phenomena is not entirely satisfactory, but is at least hopeful.

At this point we beg to submit a criticism of the recently reported work of Adler and Asbury (9). It is only because this published effort has received such wide circulation in America that we consider this honest but puerile attempt to increase diagnostic knowledge of gastric ulcer. In the first place, the work was entirely by radiographs, and in the second place, is based upon the futile ambition of Hemmeter to prove that bismuth will mass itself upon the crater of an ulcer. Haudek and Faulhaber, who may easily be rated as superior roentgenologists to the investigators under discussion, have not been able to verify such probabili-

ties. Adler reports the efforts of Matthes of Cologne (the reviewer having been unable to obtain the original communication of Matthes and Adler fails to state his bibliographical references), who gave bismuth by mouth for several days and after discontinuing for two days, radiographed the patient. Matthes' idea was that a firm crust of bismuth formed upon the ulcer, which would persist. He was, however, successful in only two cases out of many. Such observations should only serve to show the futility of similar efforts, but Adler pursued an almost identical technique in that he gave bismuth carbonate 1½ drachms in half a glass of water and waited four to six hours to take the first negative of the stomach area. If there was a shadow upon the negative he believed this to be the residue deposited in the crater of the ulcer, the stomach having emptied itself. A second negative of the stomach, now filled with a bismuth emulsion or suspension, was then taken to verify the constancy of this bismuth fleck on the first negative within the area of the stomach. He reports 6 cases; clinical evidence of ulcer was definite in 3, presumptive in 2; the *x*-ray shadows proved to Adler the diagnosis of gastric ulcer. But in only one case was an operation performed and ulcer determined absolutely. The other cases were cured by ulcer treatment. Such is not conclusive evidence of the value of this method and Adler fortunately states that his report is only preliminary. It is unfortunate that a representative American journal should publish such a report, which was most cordially criticized at the recent American Roentgen Ray Society meeting in Detroit, and which does not bear witness to a thorough knowledge of previous efforts in similar lines.

Reiche (10) was one of the first to report a roentgenological diagnosis of a gastric ulcer with post-mortem verification. The patient, a man of forty-seven, gave typical symptoms of gastric ulcer. The fluoroscopic demonstration of the bismuth-filled stomach showed a finger-like projection upon the lesser curvature, which filling defect could not have been due to any gross change in the walls of the stomach. The relation of the peristalsis of the greater curvature, or any compensatory contractions simulating hour-glass stomach are not mentioned. The post-mortem examination revealed a penetrating ulcer into the pancreas. Reiche makes note of the fact that the examination of the stomach twenty-four hours after original fluoroscopic effort did not reveal any bismuth remaining at site of ulcer. This may have been due to the fact that the penetrating ulcer had a clear exit with no pocketing or puckering of the edges at the stomach wall, such as is noted in Haudek's and Faulhaber's cases.

This isolated report of Reiche has been followed by the report of many similar cases by Haudek (3-4) and Faulhaber (2), who independently but contemporaneously, studied out carefully upon a large number of cases, the roentgen diagnosis of penetrating and callous ulcers of the stomach. Inasmuch as these two investigators have reported almost identical findings, the article of Haudek (4) will be reviewed at length because of its convenient systematic form.

Haudek (4) states: 1. The supposition, that remnants of bismuth attach themselves to flat superficial ulcers and give *x*-ray shadows, is wrong. 2. Remaining particles of bismuth, after a bismuth meal, are due to the deposition of the bismuth in pathological niches produced by cicatrization about ulcers. 3. The penetrating ulcer presents a special form of the *x*-ray shadows, in which there appears to be a diverticulum, and above this shadow there will sometimes occur a gas bag of air similar to the *magenblase* of the stomach. The roentgen examination

of penetrating ulcer will show: 1. An isolated fleck or projection of bismuth near the normally filled stomach. 2. A gas bag may be demonstrated above this bismuth shadow. 3. The bismuth shadow persists in this location, and, 4, palpation fails to dislodge or disturb this bismuth shadow. Faulhaber observes that the palpating hand of the operator will be able to press the bismuth contents to the upper and lower poles of the stomach, but that the bismuth shadow still persists in the niche of the ulcer. 5. If the patient lies upon the right side, after the ingestion of the bismuth meal, the bismuth can reach the usual site of the ulcer upon the lesser curvature more readily. 6. By turning the patient, the penetrating ulcer upon the posterior stomach wall (and covered, therefore, in the anterior posterior inspection by the shadow of the bismuth-filled stomach) can be brought into view. The penetrating ulcer usually attaches itself either to the left lobe of the liver if on the anterior wall, and to the pancreas if upon the posterior wall. The liver-ulcer is therefore near the anterior abdominal wall, and the pancreas-ulcer is farther away; therefore, the pancreas-ulcer shadow is behind the turning axis of the erect body, and if (1) during fluoroscopic examination in the erect anterior posterior position the tube is displayed sideways, the abnormal shadow of a liver-ulcer will show hardly any change in position, but if it is a pancreas-ulcer there would be a considerable side movement or displacement of the shadow with similar technique. If the patient is turned and the tube remains stationary (2) the liver-ulcer shadow moves in the same direction as the patient, but the pancreas-ulcer shadow moves in an opposite direction. Again (3), the liver-ulcer shadow moves with respiration and the pancreas-ulcer shadow does not. Lastly (4), by pressure upon the abdominal area corresponding to the ulcer shadow, of if the patient draws in the abdomen, it is seen that not only the bismuth shadow but also the liver moves upward. Such a sign is not seen in pancreas-ulcer.

Haudek mentions that in stomach-liver ulcer one finds a resistance, mostly in the epigastrium to the left of the middle line, or one may find a hyperesthetic area upon the anterior abdominal wall corresponding to the projected shadow of the liver-ulcer. Contrarily, the penetrating pancreas-ulcer has few clinical symptoms, with the exception of pain in the small of the back, which radiates between the shoulder blades, and no muscular tenderness or hyperesthesia.

Haudek cites 25 cases which he was able to follow through carefully and study in their clinical, roentgen, operative or post-mortem and subsequent history phases. Haudek considers all the cases of Jolasse and Hemmeter, in which the roentgen diagnosis was considered to indicate flat ulcers, to have been penetrating ulcers. Proceeding further, Haudek lays down some differential points between the roentgen diagnosis of gastric ulcer and carcinoma, *i. e.*, carcinoma gives the appearance of a filling defect produced by a pathology that encroaches upon the lumen of the stomach; the edges of the bismuth shadow are irregular and the area of the filled portion of the stomach involved is lessened. Contrarywise, the penetrating ulcer-shadow is like a diverticulum to the normally filled stomach, with no material lessening of the gastric lumen. Also, in the penetrating ulcer which has produced quite an area of necrosis in the adherent organ, one will notice a gas bag above the bismuth-shadow which is rarely encountered in carcinomatous cases. Haudek quotes German surgeons (Kuettner and Payr) to state that from 26 to 43 per cent. of penetrating ulcers change to carcinoma. The diagnosis of a pen-

etrating ulcer, therefore, is a step toward the early attack upon an eventual carcinoma. While Haudek does not make special mention of the picture of an hour-glass stomach in his report, the various illustrations would indicate its presence frequently.

Faulhaber places eminent value upon the observation of an hour-glass indentation of the stomach in the region of the ulcer and the possibility of the recognition of a stomach-ulcer perforation into another organ, according to the technique described by Haudek. While the hour-glass constriction is almost always present where there is much cicatrization about an ulcer, it may also be present in the flat, florid type of ulcer. Out of 15 cases of hour-glass stomach examined, Faulhaber diagnosed 10 as due to a fluorescent ulcer. Four of these were operated upon and the diagnosis established as correct.

Faulhaber concludes that (a) with positive clinical symptoms and the fluoroscope showing a bismuth fleck or projection upon the lesser curvature, with a coincident and neighboring hour-glass contraction, the diagnosis of a deep adherent ulcer, eventually perforating, may be made with certainty and the case belongs to the surgeon; (b) with clinical conclusions of gastric ulcer, the presence of an hour-glass contraction alone cannot but place the diagnosis of gastric ulcer in the balance.

Rieder (1) likewise does not think that a fresh ulcer can be demonstrated, but if the ulcer is of the deep, penetrating or callous type, the diagnosis is possible indirectly by the pathological processes demonstrable. The fluoroscopic demonstration of secondary changes in form and size of the body and openings of the stomach caused by processes of contraction and perigastritis, permits conclusions to be drawn regarding past and existing ulcers and indicates the mode of treatment. Much of Rieder's article deals with the etiology of gastric ulcer. He recites similar roentgen findings to Haudek and Faulhaber. In addition, he mentions the possibility of a subphrenic (false) pneumothorax *i. e.*, a gas-containing abscess in and above the liver resulting from a perforating ulcer. The fluoroscope here shows the diaphragm pushed upward by the gas, while the underlying collection of pus will show a sharp line at its surface and the succussion wave may be shown by shaking the patient. Perigastric adhesions of the stomach wall to the abdominal wall prevent the excursion of the stomach with respiration and palpation. Adhesions of the stomach and colon prevent the separation of their bismuth shadows by palpation. Perforations into the small or large bowel will permit the observation of the passage of bismuth pudding from the stomach, as in a gastro-enterostomy. After consideraable discussion of the different forms of hour-glass contractions, indentations, and the alterations in the filling of the stomach by such phenomena. Rieder devotes some space to the consideration of the intermittent or pseudo-hour-glass stomach which may be dependent upon an ulcer, erosion or other local irritation. Such spastic or tetanic contractions of the stomach muscles may persist for some time and must not be confused with an organic constricture.

The foregoing review brings us, therefore, to the conclusion that at the present time the fluoroscopic *x*-ray offers us advantages in the diagnosis of deep penetrating and cicatrized ulcers, while the fresh, florid ulcer cannot as yet offer conclusive *x*-ray evidence. There is no doubt but that the future will reveal much that is based upon the studied efforts of the men whose articles are here reviewed.

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RECENTLY PROPOSED REACTIONS FOR THE DIAGNOSIS OF CARCINOMA OF THE STOMACH.

A REVIEW OF RECENT LITERATURE.

By Jesse S. Myer, M. D., of the Editorial Staff.

1. Lyle and Kober: The Glycyltryptophan Test for Carcinoma of the Stomach. (*New York Med. Jour.,* June 4th, 1910.)
2. Weinstein: The New Test for Cancer of the Stomach with Suggested Improvements. (*Jour. of the American Med. Assoc.,* Sept. 24th, 1910.)
3. Kuttner and Pulvermacher: The Presence and Diagnostic Significance of a Peptid Splitting Enzyme in the Stomach Contents. (*Berl. klin. Wochenschr.,* Nov. 7th, 1910.)
4. Livierato: Hemolytic Substances in the Stomach and their Supposed Specific Significance for Carcinoma. (*Berl. klin. Wochensch.,* Aug., 1st, 1910.)
5. Grafe: Significance of Oleic Acid in the Diagnosis of Carcinoma of the Stomach. (*Muench. med. Wochenschr.,* Sept. 20th, 1910.)
6. Ascoli: The Specific Meiostagmin Reaction. (*Muench. med. Wochenschr.,* Jan. 11th, 1910.)
7. Ascoli and Izar: Meiostagmin Reaction with Malignant Tumors. (*Muench. med. Wochenschr.,* Feb. 22d, 1910.)
8. Meiostagmin Reaction. (Editorial, *Jour. of the American Med. Assoc.,* May 28th, 1910.)
9. S. d'Este: The Meiostagmin Reaction in Surgery. (*Berl. klin. Wochenschr.,* May 9th, 1910.)
10. Stabilini: The Meiostagmin Reaction and Malignant Tumors. (*Berl. klin. Wochenschr.,* Aug. 8th, 1910.)

There have been proposed within the last twelve months, several diagnostic tests for carcinoma of the stomach, which, if the results recorded in the first publications on the subjects are borne out by further experience, will play a valuable part in the diagnosis of this condition. One of these, the tryptophan reaction, rests upon the fact that the pepsin of the normal stomach does not hydrolize proteids completely, that is to say, no amino-acids are formed in the normal stomach. Cancerous tumors, however, elaborate an enzyme, which exhibits strong proteolitic powers and is capable of splitting proteins, as well as simple peptids into amino-acids. In testing for the presence of this enzyme in the stomach-contents, Neubauer and Fisher have made use of a simple synthetic peptid glycyltryptophan which when treated with a suitable proteolitic ferment is split into its component amino-acids, glycin and tryptophan, the latter being easily detected by simple chemical tests. An Ewald test-breakfast is extracted after thirty to forty-five minutes and filtered. Glycyltryptophan is treated with a portion of the filtrate and the mixture

placed in an incubator for twenty-four hours, and then tested for tryptophan as follows: About 3 or 4 c.c of the mixture are placed in a test-tube and a few drops of 3 per cent. acetic acid added. A saturated aqueous solution of bromine is then added drop by drop, until a reddish-violet to a rose-red color appears, which shows the presence of tryptophan. An excess of bromine must be avoided. Weinstein has found that the reaction may be obtained without glycyltryptophan, for the reason that the enzyme secreted by the cancer is powerful enough completely to hydrolize the protein of the food as well as the glycyltryptophan. There are other reasons, among which are cost and possible instability of the product for dispensing with the glycyltryptophan. Nor does Weinstein find that the Ewald test-breakfast is advisable. His directions are as follows: Four or five hours after a regular dinner some stomach-contents are procured, filtered and tested with bromine water for tryptophan. If present, the reaction is positive, if absent, some of the filtrate transferred to a stoppered bottle is put into the thermostat and tested again for tryptophan, after twenty-four or forty-eight hours. The most serious defect of the test is its inconsitancy. The reaction may be present in one specimen and absent from another in the same patient. Therefore, tests of specimens obtained at three or four different times should be made. The stomach contents must never be blood-colored, nor stained with colored food-stuffs. Free hydrochloric acid may interfere with the test. Weinstein believes that the tryptophan test is a valuable sign in the diagnosis of gastric cancer, but is unable to say whether or not it is present early. There seems to be considerable danger that trypsin regurgitating through the pylorus may completely hydrolize the proteins and give rise to the reaction. Nor is the test for bile sufficiently delicate to exclude the presence of trypsin. Lyle and Kober advocate waiting from twenty to twenty-four hours after the last meal before giving the test-meal, so that the intestines will be empty and regurgitation improbable. Still their experience with 10 cases in which they got a negative reaction, and in which there was no free hydrochloric acid, shows that regurgitation is at least not constant.

Kuttner and Pulvermacher on account of the cost of glycyltryptophan have used a preparation of Hoffman, La Roche & Co., "Seidenpeptone," and find the results correspond throughout. They find the reaction valuable, but by no means specific. On the one hand, certain cases of undoubted carcinoma gave repeatedly negative results; on the other, normal stomachs and those with various benign conditions frequently showed positive reactions. This is in all probability, they say, due to the presence of pancreatic juice in the stomach, but they have not found tests for the presence of bile a sufficient control for the presence or absence of trypsin.

Grafe and Rohmer have found a hemolytic substance in the stomach of carcinomatous patients. This action they now believe is due to oleic acid which is powerfully hemolytic; 0.0003 grm. sufficing to hemolize 1 c.c of a 5 per cent. emulsion of human corpuscles in two hours. The oleic acid comes probably from the degenerative changes in the tumor itself. The amount of oleic acid can be determined by the iodine titration method (Hubl). Not all stomach contents can be used for the determination. In cases of retention the stomach must be washed clean before the Ewald test-breakfast is given. If this is impossible the test is useless. There must be no duodenal contents present as indicated by the presence of bile-pigment. With this method Grafe, in 77 non-cancerous patients, found two positive reactions, and in 22 cases of carcinoma and 2 cases of ulcer the reaction was negative.

Livierato using a somewhat different technique was unable to find any specific hemolytic reaction whatever, the hemolysis occurring in about 50 per cent. of the cases tested irrespective of disease or health.

A test recently advanced by Ascoli depends upon a physio-chemical method, and aims at determining the presence of immune bodies in sera. (This test is applicable not only in suspected gastric carcinoma, but in carcinomata in general; hence it is only superficially touched on here. An exhaustive review of the literature bearing upon the Meiostagmin reaction will be found elsewhere in this issue.) The term meiostagmia (meaning small drop), has been coined by Ascoli, the appropriateness of the term lying in the fact that the surface tension of a given fluid may be measured by the size of the drop the fluid forms when flowing from a small pipette. Investigation was carried on to determine what changes, if any, occurred in the surface tension as the result of the reaction between the immune sera and their respective antigens. The measurements were made by means of Traube's stalagmometer. To a definite amount of serum from a typhoid patient (diluted with sodium chloride solution) was added a certain amount of antigen (extract of typhoid bacilli), and the drops immediately counted. The mixture was then placed into an incubator for two hours, allowed to cool, and then the drops were counted again. A diminution of the surface tension was found to occur under these circumstances, that is to say, the number of drops formed in a given time was increased. The differences are not great, 1 to 3 drops, but are definite and constant, and the technique according to Ascoli is not difficult nor subject to much error. The reaction takes place even in high dilutions of the antigen. Izar and Ascoli then applied the reaction to carcinoma, at first experiencing some difficulty in obtaining suitable antigen which was finally derived from the transplanted sarcomata of rats. It is noteworthy that this antigen from an *animal sarcoma* reacts with the *human* sera of individuals with *carcinoma*. The reaction, tested by practically the same technique as described above for typhoid, resulted positively in 58 of 62 cases of various malignant tumors, mostly carcinoma, and failed to give a positive reaction in 48 various diseases including two cases of leukemia.

S. d'Este has used the reaction before operating on tuberculosis and carcinomatous cases. In 10 cases of carcinoma and 2 cases of sarcoma, the reaction was always positive. In 10 benign tumors the reaction was negative.

Stabilini continuing the work of d'Este has found in 32 malignant tumors 32 positive reactions, and in non-malignant cases the reactions are uniformly negative. There is often considerable difficulty in preparing the carcinoma antigen and much care and patience must be exercised.

DIAGNOSTIC AND THERAPEUTIC NOTES.

The Use of the Cystoscope in the Examination of Serous Cavities.—Jacobaeus (*Muench. med. Wochenschr.*, 1910, No. 40). By means of a trochar, Jacobaeus punctures the pleural or peritoneal cavity, inserts a very small cystoscope through the opening and examines the serous lining. If an ascites or a pleuritic effusion is present, the procedure is evidently without danger. In the absence of fluid, injury to the lung or the intestines can be avoided by injecting a little air through the trocar, though Jacobaeus has found that with sufficient care this precautionary measure is unnecessary. In a number of cases he has found this method of considerable diagnostic value. Thus he was able to make out changes in the peritoneum suggestive of chronic peritonitis, could see distinctly cancerous nodules on the liver, perihepatitis and, in a clinically doubtful case, could make out a gastric cancer. In the pleural cavity, his observations have thus far not led to definite diagnostic conclusions.

Carbohydrates and Thyroid Extract.—Mayerle (*Zeitschr. f. klin. Med.*, Vol. 71, Nos. 1, 2). In the administration of thyroid extract, symptoms of intoxication may arise rather suddenly, especially when the dosage is increased. These toxic manifestations are due to a greatly increased proteid metabolism and fat combustion. Mayerle has found that the administration of large quantities of carbohydrates, in conditions of artificial hyperthyroidism, results in a diminished proteid destruction without interfering perceptibly with the increased fat combustion. As this is exactly the state of things ordinarily desired when thyroid extract is administered, he concludes that the diet of such patients should contain not only sufficient proteid, but also as large an amount of carbohydrate as possible.

The Examination of the Stomach by Means of Bismuth Capsules.—Cohn (*Berl. klin. Wochenschr.*, 1910, No. 39). Gelodurat capsules are gelatin capsules treated by means of formaldehyde and are entirely insoluble in the gastric contents. Cohn has the patient swallow two such capsules, one filled with one gram of bismuth, the other partly filled with half the amount. The former promptly sinks to the bottom of the stomach contents, while the latter, being lighter, floats on top. When such a patient is examined radioscopically, the two capsules can be distinctly made out. Their position and their subsequent behavior give information as to the position of the lowest point of the stomach, the height of the gastric content at various stages of digestion and the general motility of the stomach.

Subcutaneous and Intravenous Administration of Grape Sugar.—Berendes (*Zentralbl. f. Chir.,* 1910, No. 37). In cases where gastric alimentation is contraindicated, it is still customary to take refuge in nutritive enemata although it has been repeatedly shown that they are entirely ineffectual. Berendes recommends Kausch's method in such cases. This consists in the subcutaneous or intravenous injection of 5 to 7.5 per cent. solutions of grape sugar. These cause no more discomfort than similar injections of physiological salt solutions and are entirely harmless. If one liter is injected in the twenty-four hours, this represents the administration of 200 to 300 calories daily, an amount which may well suffice to tide the patient over his period of semi-starvation. After several days of this treatment, a slight glycosuria may set in, but this involves the loss of only 5 per cent. of the sugar administered.

Dangers of Tuberculin Therapy.—Wolfsohn (*Mediz. Klinik,* 1910, No. 37). Wolfsohn reports a case, illustrating the fact that the tuberculin therapy may produce unfortunate results even in minimum dosage. The patient, a woman 34 years old, had 22 years before passed through an attack of coxitis, which had healed with considerable impairment of function. Recently, tuberculous abscesses of the right breast had made their appearance. In addition to surgical measures, a course of injections of new tuberculin was inaugurated, beginning with 1/10,000 mg. The breast infection healed rapidly and smoothly, but after the seventh injection the old coxitis scars reopened and resulted in obstinate sinuses with caseous suppuration. While such an unfortunate result need not lead to the abandonment of tuberculin therapy, it warns us to be extremely cautious in its use.

Abortive Treatment of Gastric Crises in Tabes by Means of Spinal Anesthesia.—Sapatsch-Sapotschinski (*Russk. Wratsch.,* 1910, No. 34; abstr. in *Deutsch. med. Wochenschr.,* No. 38). The pain of gastric crises is often so intense, that non-toxic doses of morphine are of no avail, and we feel obliged to have recourse to long continued ether or chloroform narcosis. In several such cases, the writer has been able to suppress or greatly diminish the pain by means of lumbar spinal anesthesia. The procedure seems logical and comparatively safe and deserves a trial in this desperate predicament.

Severe Chronic Colon Spasm.—Schuetz (*Berl. klin. Wochenschr.,* 1910, No. 37). Chronic, primary colon spasm is a rather rare disease, but one with a definite symptomatology. It probably always arises on a nervous or psychic basis. In Schuetz's cases, the diagnosis was apparently not difficult. The entire ascending colon, descending colon and sigmoid flexure could be palpated as strongly contracted and very tender cord and the skiagram clearly showed the entire large intestine to be participating in the spasm. The treatment is that of any other neurosis. As regards diagnosis, however, we are not justified in diagnosing primary (*i. e.* neu-

rotic) colon spasm, unless every local source of irritation can be excluded. We have observed two cases of what were apparently typical neurotic colon spasms. One turned out to be a chronic appendicitis, the other a carcinoma of the hepatic flexure.

Atropin in Gastric Ulcer.—Schick (*Wien. klin. Wochenschr.*, 1910, No. 34). In gastric ulcer, the resultant pylorospasm and hypersecretion are due to vagus irritation. The latter can be eliminated by means of the systematic administration of atropine and this explains the favorable results obtained by the use of this drug in such cases. Schick advises the daily hypodermic injection of one milligram of atropine for two weeks. The subjective symptoms, especially the pain, disappear promptly. The hyperacidity and the hypersecretion are more obstinate but with persistence in the treatment may also be made to vanish. He also obtained good results with this treatment in spastic constipation, lead colic, membranous enteritis and various forms of intestinal obstruction. He even finds this treatment worth a trial in gall-stone and renal colic.

Our own experience with atropin in gastric ulcer is not so favorable. The symptoms can unquestionably be relieved thereby, but the ulcer seems to persist since the production of occult blood persists and relapses are the rule. Two courses alone promise permanent results: prolonged rest in bed with bland diet or surgical interference.

Anesthesia of the Eyeball in Nervous Disorders.—Vidosi and Gatti (*Riform. med.*, 1910, No. 32). A number of diseases of the nervous system are characterized by a diminished sensitiveness to pressure on the part of the eye-ball. This phenomena is probably due to involvement of the sympathetic system and is especially valuable for the diagnosis of tabes dorsalis, in which it is sometimes an early symptom.

A Variation of the Cutaneous Tuberculin Test.—Barabaschi (*Gaz. d. osped.*, 1910, No. 34). A small area of skin is energetically rubbed with a bit of cotton or gauze, wet with absolute alcohol, until the skin appears reddened. A little pure tuberculin is then spread over this area and allowed to dry on. This requires only a few minutes. The reaction sets in, in 24 to 72 hours, with the formation of small reddish papules that are often crowned with tiny vesicles. The eruption heals rapidly and never causes any inconvenience. The writer reports a large number of such tests made in the hospitals of Turin and Cremona. The method seems not inferior to that of von Pirquet and to possess a certain advantage in the avoidance of the scarification.

OBITER DICTA FROM FOREIGN JOURNALS.

ULTRAMICROSCOPY.

The interest in ultramicroscopy is undoubtedly on the increase if we are to judge so from the recent publication of N. Gaidukov's "Dunkelfeldbeleuchtung und Ultramicroscopie in der Biologie und in der Medizin," Levaditi's cinematograph films exhibited at St. Thomas's Hospital, London, on November 9th, 1910, and L. Houllevigue's "L'Ultramicroscopie" in *La Revue de Paris* of October 15th. The subjoined translation of Houllevigue's essay, we take it, has so many salient points to hold the reader's interest that a perusal of it can only result in profit:—

There is as much infinity in a particle of dust as in the whole firmament. Just as the telescope reveals to us the world of stars, the microscope conveys to us from day to day more and more of the world of the infinitesimally small. We are almost at the point where molecules can be seen, and are almost able to unite them into a mass by the strength of our reasoning powers.

And since the kinetic theory of matter has become a physical certitude, thanks to the microscope, it cannot be without interest to learn how, in the course of centuries, this instrument arrived at its present degree of perfection; in fact, ever since Zaccharias Janssen, a spectacle-maker of Middleburg, Holland, made the first one in 1590 by attaching two magnifying glasses to the extremities of a copper tube. The first microscope with which the Dutch naturalists of the seventeenth century made their interesting discoveries magnified from twenty to fifty times in diameter. The object pictures which resulted were not clearly outlined but were iridescent. Some years later Art and Science became closely associated and the spectacle-makers were succeeded by the opticians, who made considerable progress on account of their knowledge of theoretic optics. Thus in England, during the eighteenth and up to the beginning of the nineteenth centuries, the Dollonds perfected optical instruments, and among these the microscope. The ancestor of this famous line of opticians, John Dollond, showed how the object pictures could be improved by substituting for each of Janssen's simple glasses an assemblage of many lenses. This is the principle on which the eye pieces and objectives of the modern microscope are constructed.

But it is in Germany, at the present time, that we see the best example of the successful association of industrial technique and pure science. At Jena there are glass-works which are supported by the State and by subsidies from interested manufacturers, and in which technicians, who are at the same time savants, have developed a series of crown- and flint-glasses, by varying progressively the proportions of the divers constituents by substituting for lime various proportions of baryta and oxide of zinc, and introducing in the mass all those elements capable of being incorporated in a transparent glass: didymium, uranium, boron, manganese,

and arsenic. Finally, all the properties of the elements which were used were minutely studied. Synchronously the constructors perfected the cutting of glasses and the mechanical construction of the apparatus; while Abbé achieved, through incessant labor, the best method for manipulating the microscope.

One can form no idea of the above-mentioned difficulties, on the part of the technicians, in the face of the elementary theory of the microscope which had been firmly established for the use of students, and which can be defined as a method of approximation. In reality, the image of a luminous point is not a geometrical point, as this theory had it, but a complicated surface, which is called a caustic; and moreover each of the constituent colors of white light yields a different image. All these red, yellow, green, and blue images do not merge equally into each other and are not at the same point at the same time; hence, the image seen in the microscope was bordered with an iridescence.

It was necessary to correct all these defects; and before long an almost complete perfection was achieved by developing the principles of John Dollond and replacing the ocular and objective lenses of his microscope by lenses, the quality, curvatures and dimensions of which were carefully calculated. Finally, a step in advance was realized when homogeneous immersion was effected: the transparent specimen illuminated from below was covered with a cover-glass placed no farther than some 10 mm. from the anterior part of the objective, and in this narrow space a drop of transparent and decidedly refracting liquid—oil of cedar—was dropped. This proved advantageous, for it permitted the entrance into the microscope of a large number of luminous rays emanating from the object, which, without the oil, would have been reflected on the anterior lens of the objective; and further yielded images that were more clearly outlined, and were magnified to a greater degree.

But to achieve enlarged images was not the end of these German technicians; what they strove for was greater illumination. With a magnification of one thousand diameters, the image was one million times greater than the object, and, as a result, one million times less luminous; hence, it was found necessary to collect light from a stronger source and concentrate it on the point aimed at in studying the preparation. The microscopists of an earlier day achieved this by imitating the Italian bootmakers who use a bottle filled with water through which the rays are concentrated, so that a better illumination may be effected. But to-day we are in possession of better condensers: the concave mirror and the many convergent lenses. Nevertheless, the correct illumination should be less a matter of reunited light on the object, than the direction of the illuminating pencils of light with a convergence on one point. A negligence of this causes a phantasmagoria instead of a distinctly outlined picture. This is why the proper manipulation of the best modern microscope, with its strong magnifying glasses, requires considerable experience and technical knowledge.

Let us examine a microscope which in all its appointments represents the most modern type. It is supplied, as we all know, with two interchangeable objectives and eye-pieces, by which, without the preparation being touched, a magnification of fifty diameters up to from one to two thousand diameters can be achieved. With five hundred diameters we distinguish more of the details than with fifty; with one thousand more than with five hundred, but when we get beyond a magnification of from one thousand to two thousand diameters, although the image appears to us

to have a surface area four times larger, we cannot distinguish greater amount of details; that is to say, we have attained the limit of the separating power of the instrument. What takes place is analogous to what each of us has observed when attempting to enlarge a stereotype plate; a time comes when we gain nothing by increasing the dimensions of the picture. As regards the microscope, the separating power is determined by the smallest distance between two points which may be made out by the instrument. The unaided eye separates two points, the distance between which is not less than 1/20 mm.; and this corresponds with the construction of the retina, which is a mosaic of rods and cones, of which each forms the contiguity of one of the juxtaposed filaments in the optic nerve. The eye distinguishes only the images formed on the non-contiguous elements of the retinal mosaic; therefore, when the eye is aided by a microscope which magnifies a thousand times, two points of an object are distinguished one thousand times nearer than could be done by the unaided eye; that is to say, the distance is one-twentieth of a micron. But this separating power is difficult to achieve, the best instruments attaining only three- or four-tenths of a micron; and this limit is realized only under the most favorable conditions; as for example when we examine the lines of a network traced on glass, the cilia of certain infusoria, or the striated carapace of some Diatomaceæ. Hence we are just as incapable of seeing molecules with the microscope, though the unaided eye can distinguish at a distance of 20 km. the movements of swarming bees.

It is to be hoped that this limitation which obtains to-day is only temporary, and that the microscopes of the future will correct the imperfections which we have pointed out, and attain a separating power ten or twenty times greater than at present. Unfortunately, according to our present knowledge, the limitation seems to be definite; for though it is an easy matter to increase the magnifying power of the eye-piece and the objectives, so that the images might theoretically be more exact, such are not the results according to experience. In fact, the theory of the microscope, similar to that of other optical instruments, has been established according to the methods of geometric optics, by conceiving that the luminous rays, which are reflected by mirrors and pass through lenses, follow the laws of reflection and refraction. Thus the problem of physics is closely associated with the problem of geometry. But this theory is pure fiction. In nature there is neither a luminous point nor a luminous ray, nor in geometry a point or a line; there are, however, luminous sources which are more or less extensive and waves which are propagated from these sources.

Assuming this point of view, which is the only one that is a truism in physics, the problem completely changes its nature. The solution of this problem has been given by Lord Rayleigh, the celebrated English physicist, somewhat in the following manner: "However perfect be the optic system when penetrated by light, each element of the luminous object gives forth as its image a small circle with "stumped" outlines, which is larger in case the illumination is red, smaller in a violet light, and very much contracted in an ultra-violet light." This theory illustrates the minimum diameter of the small dots which correspond to each radiating element from the object, but in no instance is it possible to abolish the distance between two points. These two points of an object appear separated only when the points are perfectly distinct; and since in increasing the magnification we enlarge at the same time the diameter of

the points of diffraction, we can easily understand that ere long we really gain nothing by increasing the magnification. In fact, this theory shows the limit of the separating power, which is the same as the limit which compasses the best microscopes to-day.

But Nature has thrust upon man an insurmountable barrier; hence, without changing in any respect our methods of observation we can help the results obtained from the microscope, by substituting the blue or violet rays for the white rays. In this way the circles of diffraction become slowly contracted and the details of the image are seen with greater exactitude. For a long time naturalists have recognized this artifice and have utilized it in the study of the minutest details in the structure of Diatomaceæ. The slight sensibility of the eye to blue or violet rays might at first make us think this progress illusory, but the facts show that by employing, as a source of illumination, ultra-violet radiations emanating from a strong spark between two threads of magnesium and cadmium, a decided advance is accomplished. By accepting this theory two difficulties become apparent: first, these radiations are invisible to the unaided eye; and, secondly, they are arrested by the glasses of the ordinary microscope. Koehler, however, triumphed over these difficulties in 1904 by constructing a microscope of which all the lenses are of quartz, the illuminating apparatus as well as the lenses upon which the preparation rests. In this way the eye is replaced as an instrument of observation by a photographic plate, upon which is designed a magnified image that can be observed at leisure, either by the unaided eye or by means of a magnifying glass.

One can easily understand the expenses, the painstaking researches, and the actual labor which all this involves. Here it would be well to mention that the ultra-violet rays have a physiological activity which rapidly causes the death of living elements submitted to their action. This constitutes a great inconvenience for physiological observations. Another defect, not less grave, is that the colorations, employed by the micrographists for differentiating the divers elements of their preparations, are not better seen when the ultra-violet rays are employed. Nevertheless, a great step in advance has been realized by this method, for the separating power has been almost doubled; in fact, two points between which the distance is only two-tenths of a micron can be differentiated. From the point of view of direct observation of molecular grouping which is accomplished by these latest improvements, we are justified in saying that the swarm of bees, which were mentioned before as having been seen distinctly at a distance of 20 km. can be seen just as distinctly at a distance of 10 km.

When this was accomplished we thought we had reached the ultimate step in advances as regards improvements in the modern microscope. But we were mistaken, for two German savants, Siedentopf and Zsigmondy, taught us a new lesson by means of ultramicroscopy. While we must admit that this science is still in its incipiency, we are nevertheless in possession of a means of investigation, by which a more thorough study of microscopy can be effected than has been accomplished even by the most advanced methods, which brought to our knowledge the world of the infinitesimally small during the last few years.

To understand the subject of ultramiscroscopy, it would be well to mention here some facts with which our daily observations have made us familiar. We distinguish perfectly the stars on the dark background of night, and though their distance from the earth is such that each appears to us extremely small—namely, a star of the fourth magnitude is

no larger in proportion than a molecule of albumin placed 15 cm. from the human eye—the telescope is so helpful an instrument that with it we are able to see those very small stars which bear the same relation to the larger stars that a molecule of mercury or of sulphur does to larger objects in our own field of vision. The rays which emanate from each star throw on the retina a small circle of diffraction with "stumped" borders, which appears to us much larger when the light received by the eye is more intense. And it is just for this reason that the stars of the first magnitude appear to us larger than the other stars, though their real dimensions are decidedly below what the eye could possibly perceive. Moreover, it is necessary to note that the stars become invisible in the daytime, because the light that they send to the retinal elements is not greater than the light which is diffused from the various points of the sky on the other parts of the retina. The result of these familiar observations is that even an extremely small body can be seen under the triple conditions of being luminous, of detaching itself from a dark background, and of being sufficiently far removed from other luminous points. As an illustration let us examine a beam of solar light, which penetrates into a dark room through an opening in the window-shutter. We will see thousands of particles of dust incessantly stirred by currents of air; many of these particles are extremely small, their diameter in some cases not surpassing some microns. If these particles were piled one on another on a table, and illuminated in the ordinary manner, we would not be able to see them with the naked eye, although they are visible in a ray of sunshine; for the reason that the waves of the solar light are broken against each particle, whence they diverge into diffracted waves which make the impression on the eye. The same effect follows when the atmosphere appears luminous to us, since each of its points diffuses, to a slight degree, the light received from the sun. A similar phenomenon is manifested when one pours into water certain essences which produce an opalescent cloudiness; the essence is divided into thousands of small drops of which each, diffusing the light which strikes it, acts as if it were a luminous point. These small drops are of variable dimensions, and these depend on the condition of the mixture. The diffused color varies in the same way. As a general thing, the smallest drops diffuse a blue radiation, while the particles which are larger emit by preference yellow or red radiations. Another theory advanced by Lord Rayleigh explains all these phenomena; it shows that the opaque particles diffract much more light than transparent particles of the same dimensions, and that the light, diffracted by elements of the same nature, varies as the square of their volume. For instance, if the diameter of a particle is reduced by one-half, the volume is eight times less and the diffracted light sixty-four times weaker.

Upon studying all these results we realize that when a small object is brilliantly illuminated, it behaves almost as if it were luminous itself; if it is isolated on a dark background, we can see it by means of the naked eye or the microscope, though we are not cognizant of its form on account of the image formed on the retina being always a small circle. But at least we know of its existence, and we can follow its movements. If there are many similar points in the field of vision, we can count them and, to a certain degree, appreciate their size, according to the quantity and the color of the diffracted light. The microscope has the advantage over the unaided eye in that the frontal lense of the objective takes the place of a pupil that is placed very near the object picture, and through

which more light enters than would into the human eye, were the eye necessarily a dozen centimetres from the same object. This simple calculation shows that the quantity of light utilized is about ten thousand times greater in the first case than in the second.

According to these principles, Siedentopf and Zsigmondy, of Germany, and later on, Cotton and Mouton, of France, not only conceived the idea of the ultramicroscope, but put it into practical use. Suffice it to say that the preparation, whether liquid or solid, is no longer intensely illuminated from below, as with the ordinary microscope, but laterally, so that no ray falling from a beam of light illuminates by entering into the microscope. A lateral beam, concentrated by the lenses and limited by the diaphragm, illuminates only a preparation of a thickness of two or three microns. This should be remembered if we wish to have the specimen seen by the microscope detach itself from a dark background. Without this occurring, the millions of separated particles of dust, microbes, debris of cells, which swarm in all preparations, will become the centres of diffraction and spread over the whole field of vision a diffused light analogous to what is seen in the Milky Way. These precautions taken, all that is necessary is to examine the thinnest part of the specimen by the intense illumination of a microscope which magnifies about five hundred times in diameter, to realize that on a dark background there are luminous points which are immobile, when the preparation is solid, or very animated in their movements, when the preparation is liquid or gas.

At once this question arises: What are the dimensions of the smallest particles which can be distinguished by the ultramicroscope? There are colored glasses which are made by incorporating in the vitreous mass traces of a salt of gold. This glass, when it is cooled rapidly, is perfectly colorless and transparent: the gold being perhaps in a dissolved state similar to sugar in water, or divided into such minute particles that they are invisible by all the known methods. On the contrary, if the glass is allowed to remain for a long time in a doughy state, the mass takes on a rose color which passes slowly into red, then into blue and brown; then the gold contained in the vitreous mass gathers in little particles visible under the microscope. From this it appears that a progressive concentration of the gold, which can be stopped at any point desired, takes place in a vitreous mass whilst rapidly cooling; the color of the glass depending on the condition of the particles of gold, which diffuse in an unequal manner different colors, according to their forms and dimensions. Contrariwise, if the colored glass is melted again the gold redissolves and the glass becomes colorless.

The explanation which we have just given was already proposed by Faraday in 1857, but it was regarded as purely hypothetical until Siedentopf and Zsigmondy devoted themselves to the study of this sort of glass for the ultramicroscope. In cutting the parallelipids in the mass and submitting them to the lateral illumination which we have already described, they ascertained at first the presence of numerous brilliant points, which were more luminous but less numerous according to the time which had elapsed in the cooling of the glass. Therefore, the presence of particles of gold in colored glasses could no longer be doubted. But another step in advance was made by the possibility of estimating the dimensions of these particles. The analysis of glass yielding the quantity of gold contained in a certain volume, the investigators proceeded to count the visible particles in the ultramicroscopic field, the total volume of which was known; that is, the amount of gold. In this way the aver-

age amount of the particles of gold and their volume were measured. This method, applied to different types of colored glasses, showed that the smallest particles visible through the ultramicroscope had, when they were spherical, diameters between three and six millimicrons. No doubt, there are molecular agglomerations which are still smaller, and which will be visible to us only when our methods of observation are improved. Thus, certain specimens of red glass oppose an ultramicroscopic analysis because their coloration is due, beyond a doubt, to invisible particles of gold, or, as it is called "amicroscopy."

To illustrate the enormous progress which has been made, it would be well to give a list of the diameters of certain molecules:—

A molecule of helium	0.17 millimicrons
A molecule of mercury	0.28 millimicrons
A molecule of chlorine	0.4 millimicrons
A molecule of ether	0.6 millimicrons

It is necessary, when molecules are to be seen under the ultramicroscope, that they be increased ten times in diameter: that is to say, one thousand times in dimension; but the grains of gold, of which mention has already been made, should bear the relation of one thousand to ten thousand. Of course, it must be understood that these results have been realized only under the most favorable conditions, as the particles of gold are opaque, and have been immobilized by the glass; in fact, to succeed, the strongest source of light at our disposal should be utilized—namely, the solar light on a clear summer's day. What should encourage us in this work is the fact that at present the eye has a hundredfold capacity compared to what it had ten years ago.

The ultramicroscope, which is used only when we wish to see what is "beyond vision," has but few obstacles, for the molecules which we see by means of this instrument belong to a small domain that does not border on others which are as yet undiscovered countries. Hence, the inference must be that we are no longer blocked by an insurmountable barrier as was the case when further progress in microscopy was attempted. The area which has recently been opened up for us is free from obstacles: so much so, indeed, that it is highly probable that one of these days the limit attained by Siedentopf and Zsigmondy will be surpassed. To achieve what now seems impossible a greater concentration of light will not be necessary, but what will be imperative will be the substitution for the human eye of a sensitive plate which shall store up the effects of light during many hours.

BOOK REVIEWS.

DUODENAL ULCER. By B. G. A. Moynihan, M. S. (London), F. R. C. S., Senior Assistant Surgeon at Leeds General Infirmary, England. Octavo of 379 pages, illustrated. Philadelphia and London: W. B. Saunders Company. 1910. Cloth, $4.00; half morocco, $5.50.

Some years ago ulceration of the duodenum was looked upon as a rare disease; to-day, according to Moynihan, the disease is considered common, and diagnosis is made with a degree of accuracy not possible in many abdominal disorders. In the chapters amplifying the symptoms and diagnosis of chronic duodenal ulcer, he has in a characteristic way, with great clarity, developed his cases. Physical examination counts for little. The diagnosis is made by anamnesis. There is a periodicity in the recurrence of the symptoms with complete abeyance in the intervals. The attacks vary in length from two to three weeks up to several months, and come on after exposure or overwork. The pain comes on from two to six hours after eating, and is usually relieved by eating. In cases where there is acid dyspepsia it has been his experience to find duodenal ulceration, particularly in those cases where the acidity is of long standing, and the patient has occasional acid eructations. The pain is never as severe as gall-stone pains, and though it may be severe, it is tolerated. Food or an alkali has no influence in relieving pain in gall-stones, and the smallest quantity of nourishment is repugnant, while with duodenal ulcer food is craved, because of the relief.

The treatment is in all cases surgical, mainly because the disease is not recognized until there have been many attacks. The excision of the ulcer is advised in the few cases seen before the scar has started a stenosis. Posterior gastro-enterostomy, short-looped, has the greatest field of usefulness, but Finney's operation is at times indicated. This section of the book is dealt with in the detailed way that has made the author one of the greatest authorities on abdominal operations.

The section on pathology is full and complete. The illustrations from examples at operation and from pathological operations make the work complete.

MODERN SURGERY—GENERAL AND OPERATIVE. John Chalmers Da Costa, M. D. Professor of Surgery and Clinical Surgery in Jefferson Medical College. Philadelphia. Sixth Edition, Thoroughly Revised and Enlarged with 966 Illustrations, some of them in colors. Philadelphia and London: W. B. Saunders Company. 1910.

Textbooks on surgery follow each other fast, each with its own peculiar merits; some meeting the requirements of an increasing discrimination on the part of students and doctors, others falling far short. New books by new authors succeed according as their offerings fit into a real demand. Some find their work at once well received and appreciated, and in the later editions the merits are continued in the same degree which brought their earlier successes.

Da Costa some years ago started modestly but well, and met a demand which has brought forth many revisions, until now, as regards "modernity," it is perhaps the best textbook of modern scope that we can offer the student, or keep on hand as reference for the practising surgeon. Every field of work in surgery is clearly handled; the "last word" on any particular branch is given; and to help further study the proper bibliography is added. In this sixth edition particular mention has been made of arteriorrhaphy, direct transfusion, the use of aluminum bands in the treatment of aneurysms, the treatment of peritonitis, decompression for brain tumors, intravenous local anesthesia, treatment of infection by hyperemia, bacterial vaccines and many other distinctly "up to date" methods. Nevertheless, some statements will occasionally be noticed which have since been discredited, notably Rosenberger's method of finding tubercle bacilli in the blood. Again, we note an omission which would hardly have been made had the author waited a year and noted the tremendous popularity of the method practised in one of our St. Louis institutions, to wit: the method of Lane in treating recent fractures.

"Salvarsan" or "606" (Dioxy-Diamino-Arsenobenzol) Its Chemistry, Pharmacy and Therapeutics. By W. Harrison Martindale, Ph.D. Marburg, F. C. S., and W. Wynn Westcott, M. D. Lond., D. P. H., H. M.'s Coroner for North-east London. New York: Paul B. Hoeber. 1911. Price, $1.50.

The busy practitioner who has read some of the literature on the Ehrlich-Hata discovery, but who is avid to learn more, will find in this excellent work an almost complete resumé of all the papers which have appeared up to date. The original articles having appeared in the German language, the handicap for the American physician, who could not read German, was a decided one; but this has now been removed, for here are selected with excellent judgment those salient portions of the many German articles, which are illuminating enough not only to instruct the interested physician, but to warn him against pitfalls. Moreover, the translation is well done and, in these days when garbled versions are tolerated only too often, this is in itself an outstanding quality. Of special interest is the description of the technique and, since this has been so variously discussed by those who are not well informed, a careful perusal cannot be without its reward.

The Treatment of Syphilis by the Ehrlich-Hata Remedy (Dioxydiamido-Arsenobenzol). A Compilation of the Published Observations. By Dr. Johannes Bresler, Chief Physician to the Provincial Medical Establishment at Lueben, Silesia. Second Edition, Much Enlarged with the Portraits of Ehrlich and Schaudinn. Translated by Dr. M. D. Eder, with an Abstract of the Most Recent Papers. New York: Rebman Company. Price, $1.00.

This translation of the second edition of Dr. Johannes Bresler's brochure, "Die Syphilisbehandlung mit dem Ehrlich-Hata'schen Mittel," is not without interest, since it is a careful reproduction in English of a work that was compiled by its author with all the thoroughness for which the Germans are noted. Compilations such as this have their value especially for the busy practitioner, who has neither the time nor inclination to wade through innumerable articles in a foreign language. If there is one criticism that can be passed on this book it is that since its appearance in English dress Dr. Bresler has published a third edition of his brochure with all the accumulative data up to date. But even so, there is sufficient material in this book to repay the reader for a careful perusal.

Aerztliche Fortbildungskurse der freien Organisation fuer die Medizinischen Kurse an der k.k. Universitaet Wien. (Postgraduate Medical Work Under the Patronage of the Free Organisation for Medical Courses at the i.r. University of Vienna). 2 Ausgabe. Berlin and Vienna: Urban & Schwarzenberg. (New York: Rebman Company.) 1911.

This excellent little book, descriptive of how to go about to get the right sort of postgraduate work in Vienna, should be read by all those physicians who contemplate a visit to this centre of European medical learning. On every page are printed instructions in English, French and German, and these are not of the perfunctory guide-book sort, but have evidently been arranged and edited with considerable judgment. Books of this sort are a decided asset to him who knows only of foreign medical schools through hearsay, for he can read here about the various courses at first hand, which is so much better than depending on the experiences of others. The Rebman Company has kindly consented to send this book, free of charge, to anyone making application.

Die Uebertreibungen der Abstinenz. Eine Diætetische Studie fuer Mediziner und Nichtmediziner. Von Dr. Wilhelm Sternberg, Spezialarzt fuer Zucker— und Verdauungskranke in Berlin. 2 Auflage. Wuerzburg: Curt Kabitzsch (A. Stuber's Verlag). 1911. Price, 2.40 M.

This monograph of some 93 pages is a strenuous protest against total abstinence in general. The author points out, rightly enough, that the tendency in modern work in dietetics is to judge the various articles of diet solely in relation to their chemical and physical properties, without taking into consideration their flavor and general attractiveness. There can be no doubt that anything that makes a meal appetizing, renders it more useful as food,

especially in the sick-room. Hence the total exclusion of alcohol, spices and even tobacco from a patient's regimen may be a serious error. This plea for moderate use, instead of total abstinence, is overlaid with a vast amount of polemic which swells the bulk of the monograph without in the least adding to its value or interest to the reader.

DIE SYPHILISBEHANDLUNG MIT DEM EHRLICH-HATA'SCHEN MITTEL (Dioxydiamidoarsenobenzol). Zusammenstellung der bisherigen Erfahrungen. Von Dr. Johannes Bresler, Oberarzt an der Prov.-Heil-und Pflegeanstalt zu Lueben i. Schl. Zweite, bedeutend vermehrte Auflage. Mit den Bildnissen von Ehrlich und Schaudinn. Halle a. S.: Carl Marhold Verlagsbuchhandlung, 1910. Price, 1.80 M.

As a token of gratitude for an epoch-making discovery, Dr. Bresler has compiled this work which embraces all the facts made known to the profession up to the present time in regard to the new remedy for syphilis and all the experiences relating to its use. The first large edition was prepared in four weeks. The second edition is more than twice as extensive as the first, and is enriched with the portraits of Ehrlich and Schaudinn. This work will be welcomed by every physician who wishes to acquaint himself with this exhaustive treatise, as well as by all those individuals afflicted with the disease who entertain the hope of being cured through the medium of this therapeutic agent.

A HANDBOOK OF THE SURGERY OF CHILDREN. By E. Kirmission, Professor of the University of Paris, Surgeon to the Hospital for Sick Children, etc. Translated by J. Keogh Murphy, M. C. (Cantab.), F. R. C. S., Surgeon, Miller General Hospital for Southeast London, Senior Assistant-Surgeon Paddington Green Children's Hospital. New York: Oxford University Press. 1910. Price, $7.00.

This is a complete treatise on the surgery of childhood and covers so great a territory that there is considerable loss of value in considering any particular topic. It seems unnecessary to translate a book of this nature from French into English; surely we have produced enough of them. The book, however, represents a certain French point of view which is valuable and the translation is well done. It covers the subject completely and includes many subjects, especially those where plastic surgery is done, which are not found in our English or American textbooks.

LA LUMIERE ASTRALE. Traité Synthétique d'Astrologie Judiciaire. Méthode facile pour l'érection du thème sans calculs ni tables des maisons. Jean Mavéric. Paris: H. Daragon. Price, 2 fr.

We have read Mavéric's booklet on astrology with interest and some amusement but, we confess, that the outcome was merely a state of mental confusion. The book is strictly up to date. Uranus and Neptune play their part in the control of human destinies, with platinum and radium as their metals. One is tempted to ask, why not the asteroids and the rare earths? But as the author points out, the spirit of merely scientific curiosity can never plumb these mysteries. They demand a devout and unquestioning receptiveness on the part of the neophyte.

NAHRUNGSMITTELTABELLE, zur Aufstellung und Berechnung von Diaetverordnungen, fuer Krankenhaus und Praxis. Von Dr. Hermann Schall und Dr. August Heisler. Zweite, bedeutend vermehrte Auflage. Wuerzburg: Curt Kabitzsch (A. Stuber's Verlag). 1910. Price, 2.50 M.

In tables, arranged so as to be readily accessible, this pamphlet contains an enormous amount of information. Nearly everything connected with the constitution, caloric value, physical properties and digestibility of all the usual articles of diet, together with a multitude of tables, useful in metabolic work, is here ready for instant reference. The book, from its nature, will appeal rather to the scientific clinician doing research work in metabolism than to the general practitioner.

PRECIS DE MICROBIOLOGIE CLINIQUE, par Fernand Besançon, Professeur agrégé à la Faculté de Médecine de Paris. Deuxième édition, entièrement refondue. 1 vol. in 8vo. avec 148 fig. dans le texte. Price, 9 fr.

Prof. Besançon's book is a very full compendium of clinical bacteriology. The clinician who is interested in this aspect of medicine will find in it all that he requires in the way of bacteriological diagnosis, with omission of everything that has only a purely scientific interest. The one fault of the book is that the author has concerned himself almost exclusively with the results of French research. German work is not often referred to, English and American work hardly at all. Nevertheless, work done elsewhere has usually been so thoroughly repeated in France, that it is surprising how little the book loses by these omissions.

BAKTERIOLOGISCH-CHEMISCHES PRAKTIKUM. DIE WICHTIGSTEN BAKTERIOLOGISCHEN, KLINISCH-CHEMISCHEN UND NAHRUNGSMITTELCHEMISCHEN UNTERSUCHUNGSMETHODEN. Von Dr. Johann Prescher und Victor Rabs. Zweite vollstaendig umgearbeitete Auflage. Wuerzburg: Curt Kabitzsch (A. Stuber's Verlag). 1910. Price, 5.50 M.

An eminently practical book. In concise form it contains full directions for all laboratory examinations which the practical physician can have occasion to make. It contains all the newest refinements in laboratory diagnosis, in so far as they are sufficiently simple to be of use to the practitioner. For the more complex and subtle methods, the reader is referred to the more extensive textbooks.

TASCHENBUCH DER THERAPIE. Herausgegeben von Dr. M. T. Schnirer. Siebente vermehrte und verbesserte Auflage. Wuerzburg: Curt Kabitzsch (A. Stuber's Verlag). 1911. Price, Mk. 2.00.

The latest edition of this useful little volume contains some new features, such as a list of all the newer remedies, a directory of all the sanatoriums arranged according to the special purposes they serve, and finally brief descriptions of all the latest therapeutic suggestions with a bibliography to enable the reader to look up the original publications.

THE PRACTITIONER'S VISITING-LIST. 1911—THIRTY PATIENTS PER WEEK. Philadelphia and New York: Lea & Febiger. Price, $1.25.

This pocket-sized book contains memoranda and data important for every physician, and ruled blanks for recording every detail of practice. The Weekly, Monthly and 30-Patient Perpetual contains 32 pages of data and 160 pages of classified blanks. The 60-Patient Perpetual consists of 256 pages of blanks alone. Each in one wallet-shaped book, bound in flexible leather, with flap and pocket, pencil with rubber, and calendar for two years. Thumb-letter index, 25 cents extra.

THE MEDICAL RECORD VISITING LIST OR PHYSICIAN'S DIARY FOR 1911. New Revised Edition: New York: William Wood & Company.

The visiting list is arranged in the customary way for the convenient registration of all work done by the physician. The list appears in two editions, adapted for either 30 or 60 patients per week. There are specially ruled pages for memoranda, obstetric engagements; for records of labors, vaccinations, deaths, addresses of nurses, and for cash accounts. The book is bound in flexible leather, with flap and pocket.

CONFIDENCES: TALKS WITH A YOUNG GIRL CONCERNING HERSELF. By Edith B. Lowry, M. D. Chicago: Forbes & Company. 1910. Price, 50 cents.

In this little volume the problem of propagation is rather clearly explained in language well adapted to the mind of a girl between ten and fourteen.

BOOKS RECEIVED.

THE MEDICAL RECORD VISITING LIST OR PHYSICIAN'S DIARY FOR 1911. New, Revised Edition. New York: William Wood & Company.

THE PRACTITIONER'S VISITING-LIST. 1911.—Thirty Patients per Week. Philadelphia and New York: Lea & Febiger.

TRANSACTIONS OF THE AMERICAN CLIMATOLOGICAL ASSOCIATION. For the Year 1910. Volume XXVI. Philadelphia: Printed for the Association. 1910.

GUY PATIN. Par Pierre Pic. Avec 74 Portraits ou Documents. Paris: G. Steinheil. 1911. Price, 8 francs.

THE PHYSICIAN'S VISITING LIST FOR 1911. Sixtieth Year of Its Publication. Philadelphia: P. Blakiston's Son & Co.

THE PHYSICIAN'S POCKET ACCOUNT BOOK. By J. J. Taylor, M. D. 212 pages. Leather. Price, $1.00 postpaid. Medical Council, Publisher, 4105 Walnut street, Philadelphia, Pa.

THE MODERN TREATMENT OF ALCOHOLISM AND DRUG NARCOTISM. By C. A. McBride, M. D., L. R. C. P. & S. (Edin.) New York: Rebman Co. Price, Cloth, $2.00.

THE NEW HYGIENE—THREE LECTURES ON THE PREVENTION OF INFECTIOUS DISEASES. By Elite Metchnikoff. With a preface by E. Ray Lankester. Chicago: Chicago Medical Book Co. 1910.

DIE KLINIK DER TUBERKULOSE. Handbuch der gesammten Tuberkulöse fuer Aerzte und Studierende. Von Dr. B. Bandelier und Dr. O. Roepke. Wuerzburg: Curt Kabitzsch (A. Stuber's Verlag). 1911. Price, Mk. 9, 50.

THERAPEUTIQUE CLINIQUE DE LA SYPHILIS. Par E. Emery, Médecin De Saint-Lazare, Ancien Chef de Clinique a l'Hôpital Saint-Louis, et A. Chatin, Médecin des Eaux D'Uriage. Paris: Masson et Cie. 1909. Price, 10 fr.

VERHANDLUNGEN DES VEREINS DEUTSCHER LARYNGOLOGEN. 1910. Herausgegeben im Auftrage des Vereins vom Schriftfuehrer, Dr. Med. Felix Blumenfeld, Wiesbaden. Wuerzburg: Curt Kabitzsch (A. Stuber's Verlag). 1910. Price, 5m.

AN ENGLISH HANDBOOK TO THE PARIS MEDICAL SCHOOL (with Map). By A. A. Warden, M. D., Visiting Physician to the Hertford British Hospital, Paris. Second Edition. Philadelphia: P. Blakiston's Son & Co. 1910. Price, 50 cents.

FOOD AND FEEDING IN HEALTH AND DISEASE. A Manual of Practical Dietetics. By Chalmers Watson, M. D., F. R. C. P. E. Assistant Physician, Royal Infirmary, Edinburgh. Editor of the "Encyclopedia Medica." London: Oliver and Boyd. 1910. Price, 10s. 6d.

THE WIZARD OF THE DAMAVANT—A TALE OF THE CRUSADES. By J. Richardson Parke, M. D., Sc.B., Ph.G. Author of "Miss Malinger's Legacy," "Raised From the Dead," "Fabia the Vestal," etc., etc. Twenty-eight Illustrations. Philadelphia: Professional Publishing Company. 1910.

DIE UEBERTREIBUNGEN DER ABSTINENZ. Eine Diætetische Studie fuer Mediziner und Nichtmediziner. Von Dr. Wilhelm Sternberg, Spezialarzt fuer Zucker— und Verdauungskranke in Berlin. 2 Auflage. Wuerzburg: Curt Kabitzsch (A. Stuber's Verlag). 1911. Price, 2.40 marks.

THE DISEASES OF WOMEN—A Handbook for Students and Practitioners. By J. Bland-Sutton, F. R. C. S. Eng. Surgeon to the Middlesex Hospital, and Senior Surgeon to the Chelsea Hospital for Women, and Arthur E. Giles, M. D., B.Sc. Lond., F. R. C. S. Edin. Surgeon to the Chelsea Hospital for Women, and Gynecologist to the Tottenham Hospital. Sixth Edition. With 123 Illustrations. New York: Rebman Company. 1910. Price, $3.25.

MENTAL SYMPTOMS OF BRAIN DISEASE. An Aid to the Surgical Treatment of Insanity, Due to Injury, Hemorrhage, Tumours, and Other Circumscribed Lesions of the Brain. By Bernard Hollander, M. D. With Preface by Dr. Jul. Morel, Late Belgian State Commissioner in Lunacy. New York: Rebman Company. Price, cloth, $2.00.

FEVER-NURSING—Designed for the Use of Professional and Other Nurses, and Especially as a Text-Book for Nurses in Training. By J. C. Wilson, A. M., M. D., Author of "A Treatise on the Continued Fevers" and "A Handbook of Medical Diagnosis." Sixth Edition, Revised and Enlarged. Philadelphia: J. B. Lippincott Company.

LEHRBUCH DER SPEZIFISCHEN DIAGNOSTIK UND THERAPIE DER TUBERKULOSE. Fuer Aerzte und Studierende von Dr. Bandelier und Dr. Roepke. Fuenfte, erweiterte und verbesserte Auflage. Mit einem Vorworte von Geh. Rat Prof. Dr. R. Koch. Wuerzburg, Curt Kabitzsch (A. Stuber's Verlag). 1911. Price, Mk. 6, 60.

DISEASES OF THE PANCREAS—ITS CAUSE AND NATURE. By Eugene L. Opie, Professor of Pathology, Washington University, St. Louis, Mo. Formerly Member of the Rockefeller Institute for Medical Research and Pathologist to the Presbyterian Hospital of New York City. Second Edition Rewritten. Illustrated. Philadelphia : J. P. Lippincott Company. 1910.

THE NON-SURGICAL TREATMENT OF DUODENAL ULCER. By George Herschell, M. D. Lond. Lately Senior Physician to the Kensington General Hospital, and to the National Hospital for Diseases of the Heart. Formerly Physician to the West End Hospital for Diseases of the Nervous System, and to the Farringdon General Dispensary. London: Henry J. Glaisher. 1910. Price, 1s.

A COMPEND OF THE ACTIVE PRINCIPLES WITH SYMPTOMATIC INDICATIONS FOR THEIR THERAPEUTIC USE. By Harold Hamilton Redfield, A. B., M. D. Associate Professor of Therapeutics, Bennett Medical College, Chicago; Professor of Therapeutics and Physiology, Reliance Medical College, Chicago. Chicago: The Clinic Publishing Company. 1910.

THE PREVENTION OF SEXUAL DISEASES. By Victor G. Vecki, M. D., Ex-President San Francisco German Medical Society, Member American Urological Association, American Medical Association, California State Medical Society, etc. With introduction by William J. Robinson, M. D. New York: The Critic and Guide Co., 12 Mt. Morris Park, West. 1910. Price, $1.50.

PHASES OF EVOLUTION AND HEREDITY. By David Berry Hart, M. D., F. R. C. P. E., Lecturer on Midwifery and Diseases of Women, School of the Royal Colleges, Edinburgh; Sometime Examiner in the Universities of Edinburgh, Oxford, Birmingham, and Liverpool; and also to the Royal College of Physicians, Edinburgh. New York: Rebman Company. Price, cloth, $2.00.